

# **SERVICE-ROUTINE**

## **6690**



**Husqvarna**

## Directions for use

These service instructions are intended to be used by service workshop personnel or by salesmen who carry out servicing in their own districts themselves. They assume a thorough knowledge of the handling of precision appliances and accessibility to service tools.

The manual is divided into three sections and includes all service points and checks which should be carried out during a complete overhaul of a sewing machine. The first section includes the control of the accurate functioning of integral details. The second section deals with the various settings which must be maintained to ensure that the machine functions in a satisfactory way.

The third section deals with dismantling, mounting and setting the electronic units included in the machine.

The diagrams only give an indication as to where the detail or mechanism mentioned is located in the machine. For more detailed information regarding the construction, etc., refer to the diagrams in the spare parts list. The codings of the details refer to these diagrams-as an example, detail 5/37 can be seen in the spare parts list on page 5, pos. 37.

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The following details should be visually checked

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## The stitch plate

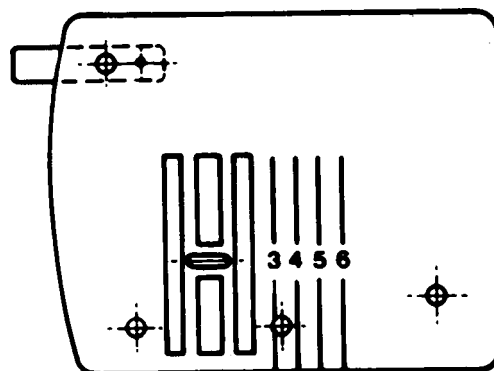
The stitch plate must not be damaged in any way. Particular attention should be paid to possible damage or unevenness around the needle hole.

### Action

Exchange the damaged stitch plate.

Spare parts: See RA, page 4.

Ordering No: Stitch plate: 411 5628-01.



## Presser foot

### Requirements

There should be no scratches on the underside of the presser foot.

### Action

Exchange the presser foot if there are scratches on the underside.

### Comments

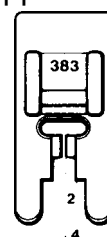
How the fabric is held between the presser foot and the stitch plate plays an important role in the stitch formation.

Spare parts: See RA, page 22.

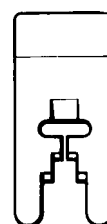
Ordering No: Zig-zag presser foot 411 1383-01

Utility stitch and pattern presser foot 411 4512-01.

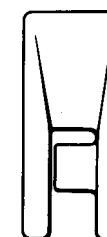
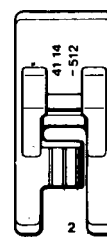
Upper side



Under side



Zig-zag presser foot 411 1383-01



Utility stitch and pattern  
presser foot 411 4512-01.

## The feed dog

### Requirements

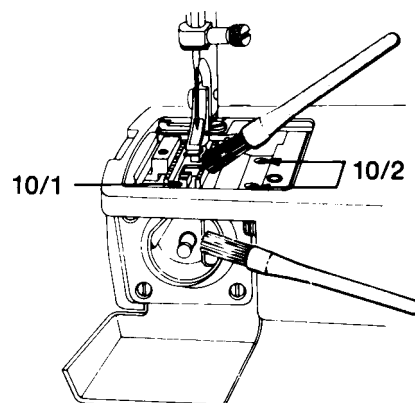
The upper side of the feed dog (10/1) must not be damaged in any way, e.g. broken teeth, etc., and should be free from fluff and pieces of thread.

### Action

The faulty feed dog should be exchanged. Remove the stitch plate. Undo the screws (10/2) and remove the feed dog. As regards the setting of the feed dog in relation to the stitch plate groove, see page 23.

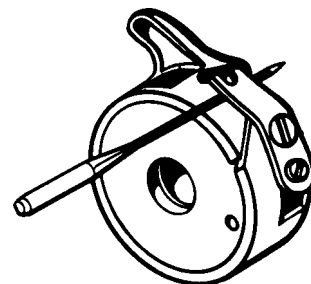
Spare parts: See RA, page 10.

Ordering No: Feed dog 411 5910-01.



## The bobbin case

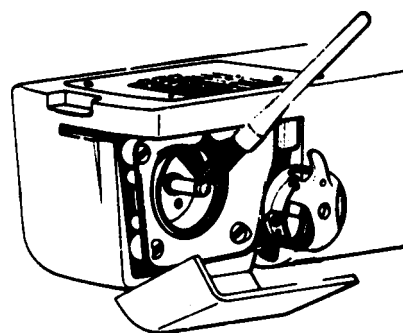
Fabric dressing may fasten under the thread tension spring and cause the thread tension to change. This can be removed by means of a needle, which should be inserted between the spring and the bobbin case.



Spare parts: See RA, page 9.

Ordering No: Bobbin case 401 1530-02.

Deposits from the fabric or thread can fasten on the spindle of the hook and cause noise. If such is the case, the spindle should be carefully cleaned with the brush in the accessory box. At the same time make sure that pieces of thread which have become wound round the spindle are removed. In bad cases, exchange the bobbin case.



Spare parts: See RA, page 9.

Ordering No: Bobbin case 401 1530-02.

## The hook cover

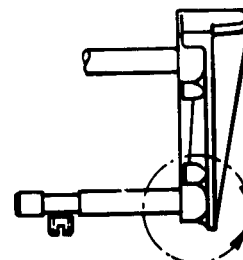
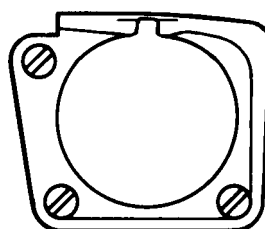
### Requirements

The inside of the hook cover must not be damaged. Both axial and radial movement should be possible.

### Action

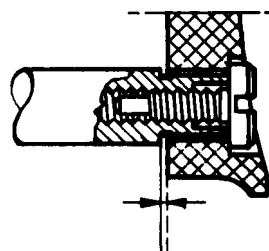
Exchange the hook cover if it is damaged.

Check that the holes in the hook cover are not blocked and that the shoulder screws and the holders are not damaged. Regarding the gap between the hook cover and the driver, see page 21.



### Comments

The inside of the hook cover makes a support for the hook and the bridge above the finger of the bobbin case supports the thread, so that the thread loop is formed on the right side of the needle. The possibility of movement in the hook cover is a prerequisite to avoid unnecessary noise.



Spare parts: See RA, page 9.

Ordering No: Hook cover 411 6662-01.

## The hook

### Requirements

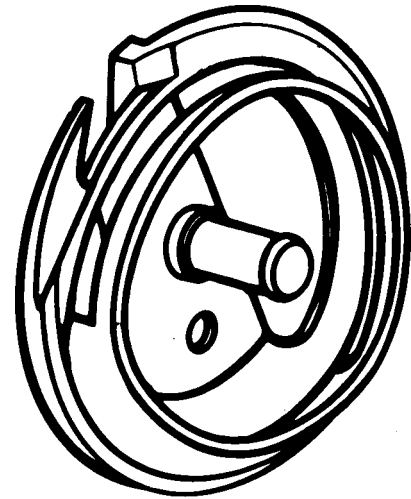
The hook must not be damaged. Special attention should be given to see that the tip has not been damaged or worn, causing burrs or unevenness.

### Action

Exchanged the damaged hook.

Spare parts. See RA, page 9.

Ordering No: Hook 401 1521-01.



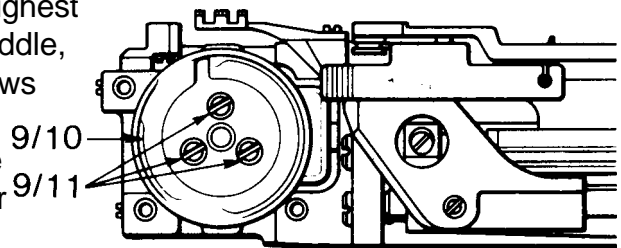
## The driver

### Requirements

The surface of the driver against the hook must not be damaged, worn or uneven in any way which might hinder the passage of the thread.

### Action

The damaged driver (9/10) should be exchanged. Turn the handwheel until the needle is at the highest position. The slot in the driver is now in the middle, underneath the feed dog. Undo the three screws (9/16) which hold the hook cover-remove the hook cover and the hook. Then undo the three screws (9/11) in the driver, and exchange it for a new one. Note the position of the slot in the driver. Thereafter "The distance between the hook and the needle" should be checked according to page 21, "The gap between the hook cover and driver" according to page 19, and "Setting the timing for the hook in relation to the needle" according to page 20.



Spare parts: See RA, page 9.

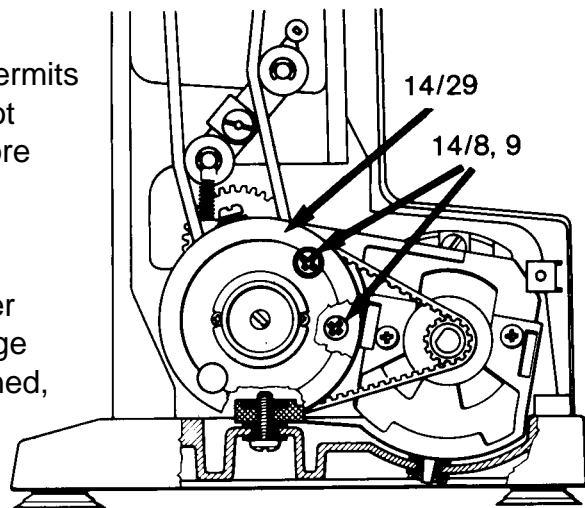
Ordering No: Driver 411 6415-01.

## The cog belt

The belt tension should not be so loose that it permits slipping when the machine is locked and the foot control is depressed. Tighter tension makes more noise. The belt should not be damaged.

### Adjustment

The screws (14/8, 9) in the reduction gear holder are accessible by means of two holes in the large cog wheel (14/29). If both the screws are loosened, a certain adjustment is possible by moving the frame for the cog wheel journal (14/20, 25, 26) one way or the other.



Tighten the screws.

Spare parts: See RA, page 14.

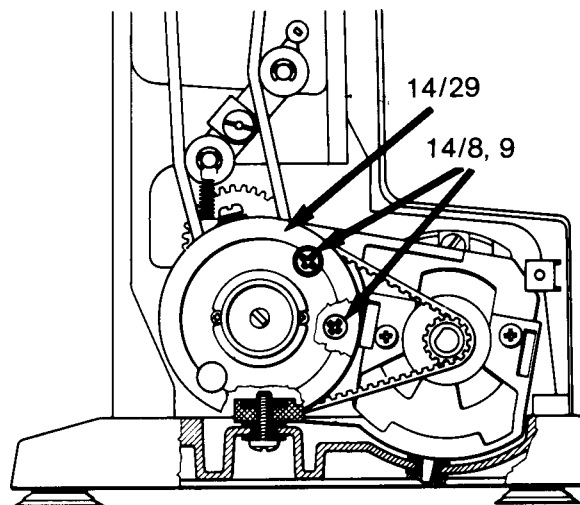
## The V-Belt

### Requirements

The belt tension should not be too tight or too loose. The slightest amount of slipping is permissible when the handwheel is held firmly and the foot control depressed.

### Adjustment

The screws (14/8, 9) in the reduction gear holder are accessible by means of two holes in the large cog wheel (14/29). If both the screws are loosened, a certain adjustment is possible by moving the reduction gear.



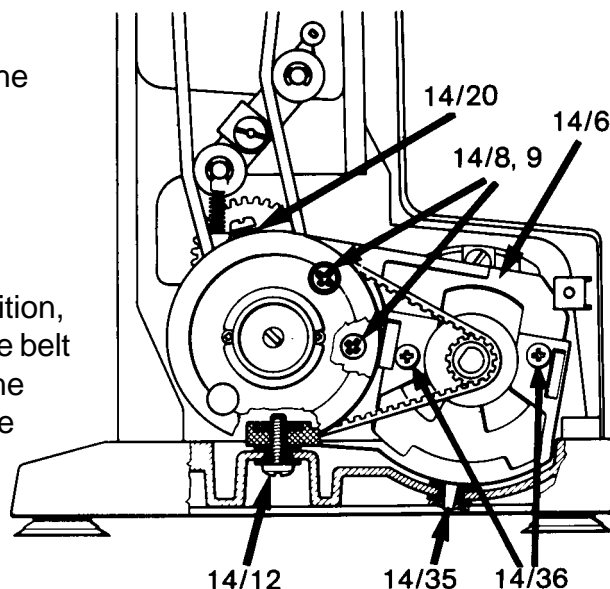
Spare parts: See RA, page 14.

## The reduction gear

Some change in the sound level when using the reduction gear is normal. The gear should be exchanged only if the sound deviation is very noticeable.

### Dismantling

Set the thread take-up lever at the lowest position, remove the handwheel and then take away the belt guard, printed circuit and cog belt. Unscrew the screw (14/12) in the base plate and loosen the screws (14/36) in the holder (14/6). The screws (14/8, 9) in the reduction gear are accessible through the holes in the large cog belt wheel. Remove both screws, turn the holder and lift out the reduction gear.



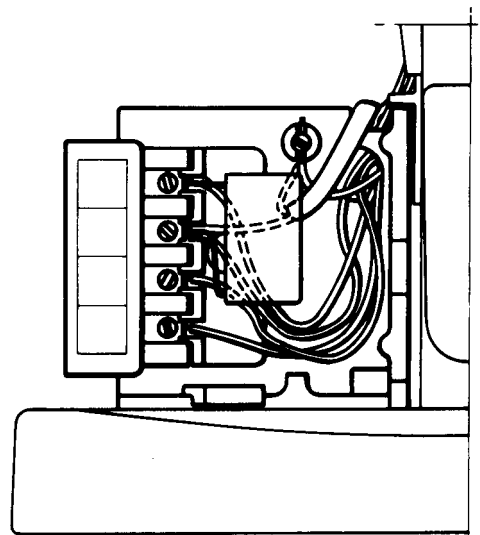
Mounting of the reduction gear is done by placing the frame (14/20) inside the holder and screwing in the screws (14/8, 9). Replace and tighten the screws (14/36, 14/12). Check that the star lock washer is in place (14/35) and check the tension. Replace the belt guard and handwheel, making sure that the thread take-up lever is at the lowest position and the metal latch on the handwheel points upwards.

Spare parts: See RA, page 14.

## The terminal board

Check all connections and cables.

If there is interference in radio or television reception from the machine, exchange the condenser.



## The motor

### Control of function

The functioning of the motor can be checked without dismantling the printed circuit. Use a spare part circuit and connect it to the connections on the terminal board and test the machine in the ordinary way.

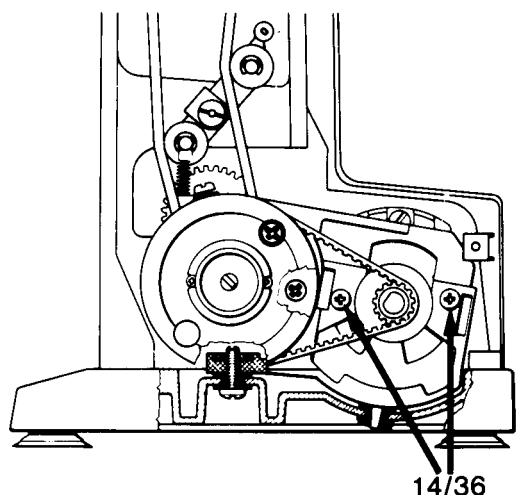
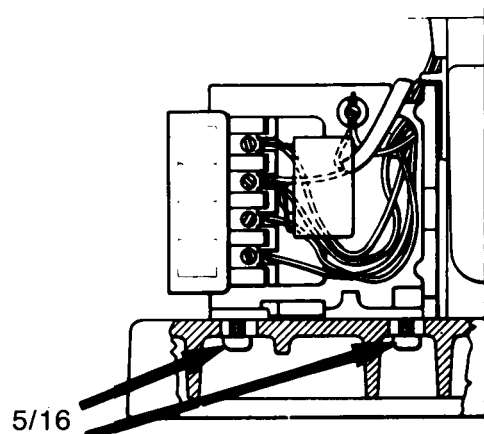
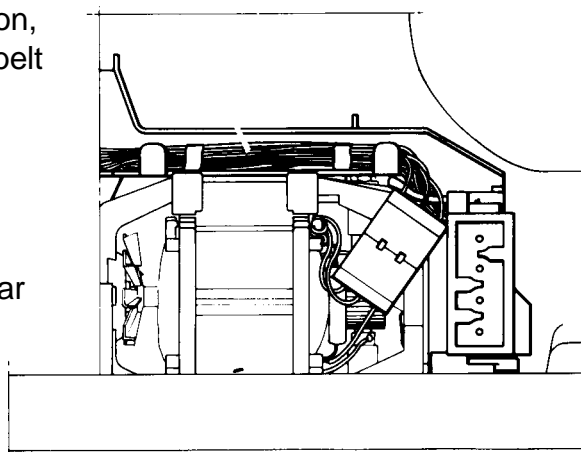
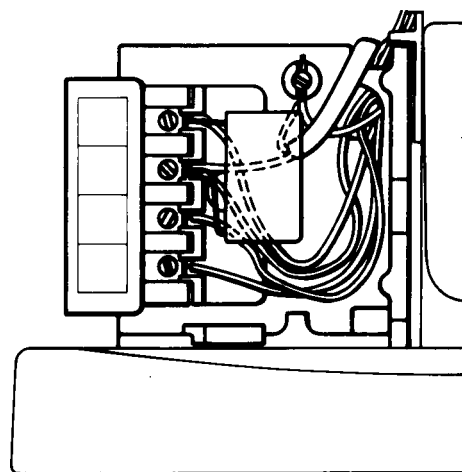
The motor noise is affected by the load and the belt tension. Only motors which have a noise level considerably deviating from normal should be exchanged.

### Dismantling

Set the thread take-up lever at the lowest position, remove the handwheel and then take away the belt guard, rear cover and the cog belt.

Pull out the plug by the motor and remove the screws (5/16) in the base plate; fold under the connection terminal board. Then remove the screws (14/36) in the holder of the reduction gear and lift out the motor. Mounting is done in the reverse order. Check the belt tension. Replace and fasten the rear cover, belt guard and handwheel, making sure that the thread take-up lever is at the lowest position and that the metal latch on the handwheel points upwards.

Spare parts: See RA, page 16.





## The foot control

### Requirements

The speed should be continuously controllable from  $100^{+20}_{-0}$  r/min to full speed.

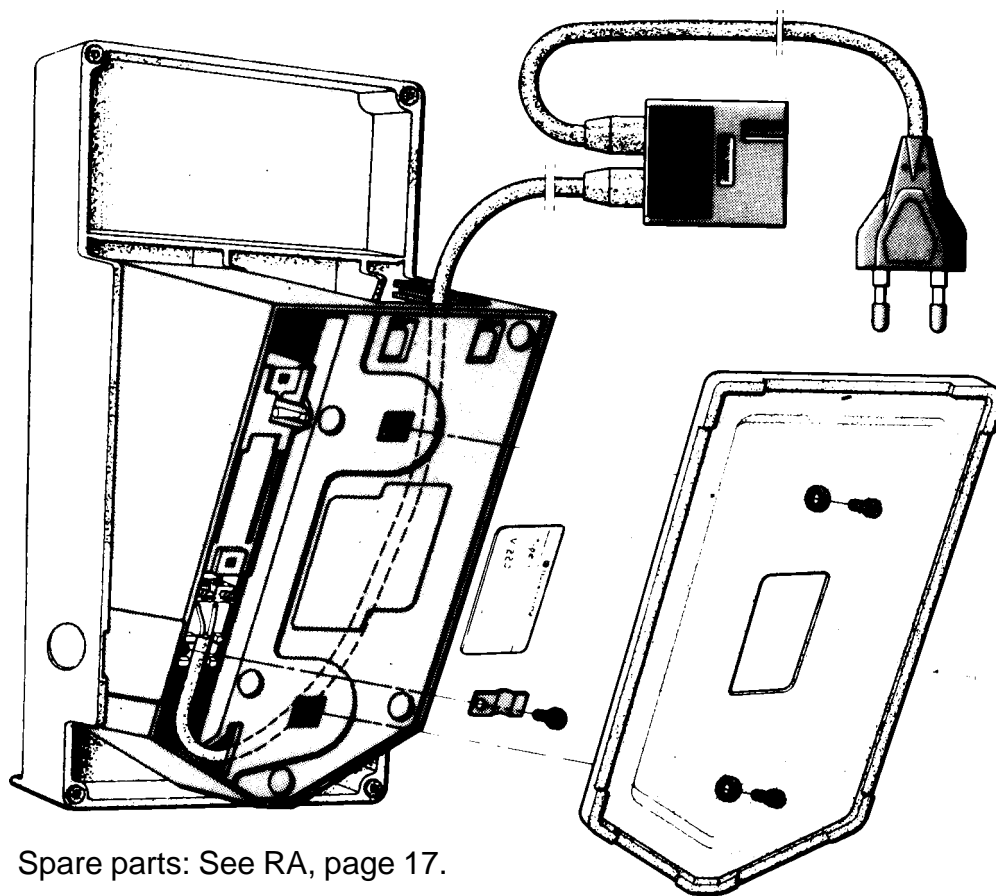
The connectors to both the wall socket and the terminal board must not be damaged or deformed.

### Action

Test the foot control on a machine which is known to operate normally.

If a satisfactory result is not obtained exchange the faulty foot control.

If the cable or plug are damaged, exchange the damaged part.



Spare parts: See RA, page 17.

## Setting instructions

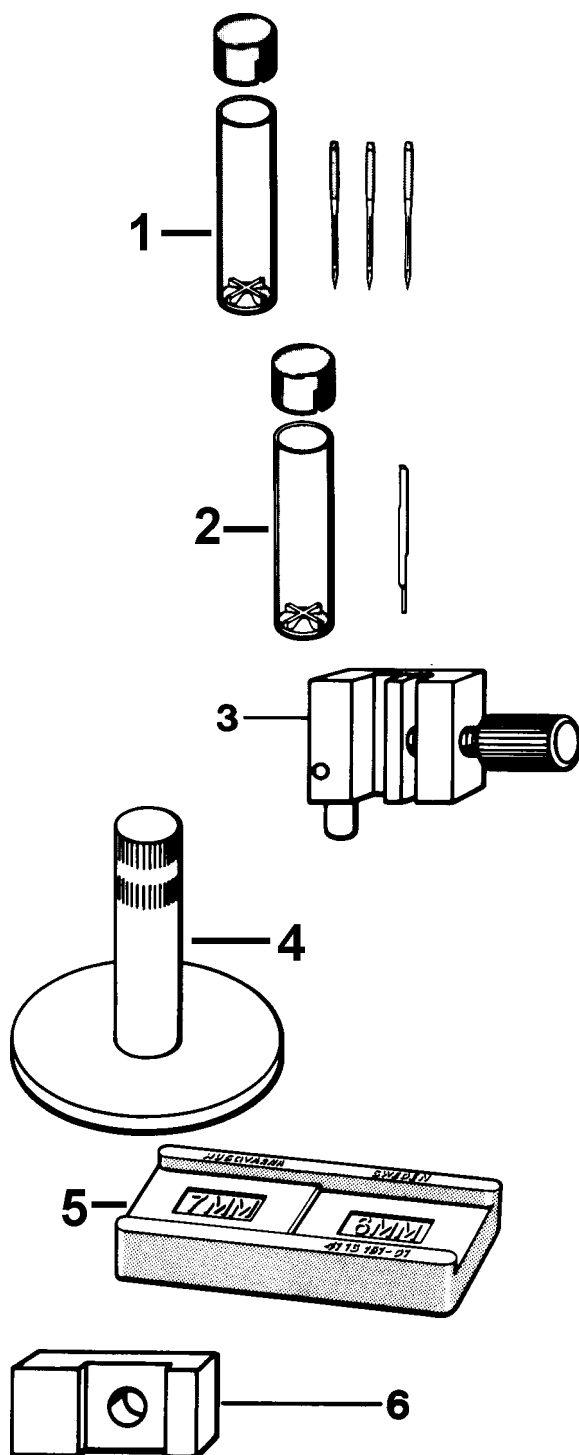
The best results will be obtained if you make the Settings in the following order at each service.

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## Setting ratings

A reasonable requirement in a domestic sewing machine is that it should be able to sew all types of fabrics used in the home. The settings made when assembling and sewing-in the machines are those most suited to give the best results in the majority of fabrics and fabric combinations. In doing so, consideration has been given to the requirements of different markets. This does, however, mean that when sewing extreme fabrics, better results may be obtained in certain cases by altering the settings. It must be pointed out that these altered settings can cause poorer results on more normal fabrics. How the different standard ratings are set can be seen from the description under each setting instruction. The following list of setting guides and service tools is chiefly intended as an indication as to how service men or service workshops should be equipped.

### Gauges



1. Service needle. Ordering No. 411 5818-01, set of 3. When making several adjustments, the needle is used as a setting guide. However, even needles of the best quality are manufactured with tolerances which can affect the setting result. These are needles which are selected from ordinary production, so that nominal values are obtained with great accuracy. The service needle is size 90 and when setting in the feeding direction, the needle should be set in the middle of the needle hole. Compare page 17. The service needles are delivered in sets of 3, packed in glass tubes.

2. Setting needle. Ordering No. 411 5800-01. For checking the maximum gap between the needle and hook, according to page 19.

3. Gauge for the hook. Ordering No. 411 1752-01. Setting the loop forming distance. To be used according to instructions on page 20.

4. Gauge for gap between the hook cover and driver. Ordering No. 411 1649-01. To be used according to instructions on page 21. Gives the same rating as setting guide 411 1635-01, which has been discontinued.

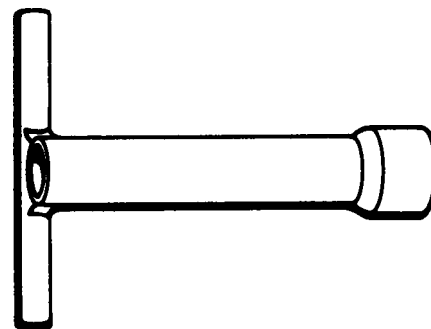
5. Gauge for presser bar. Ordering No. 411 5151-01. To be used according to instructions on page 26.

6. Gauge for feed lift. Ordering No. 411 1735-01. To be used according to instructions on page 24.

## Service tools

### Box spanner

To be used according to instructions on page 16.  
Ordering No. 411 1907-01.



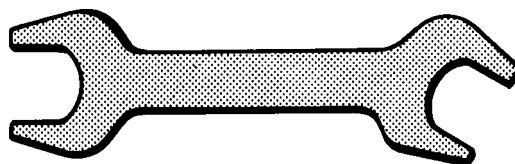
### Adam key

To be used according to instructions on pages 16 and 17.  
Ordering No. 411 5844-01.



### 3. Setting key for feeding balance.

To be used according to instructions on page 43.  
Ordering No. 411 6679-01.



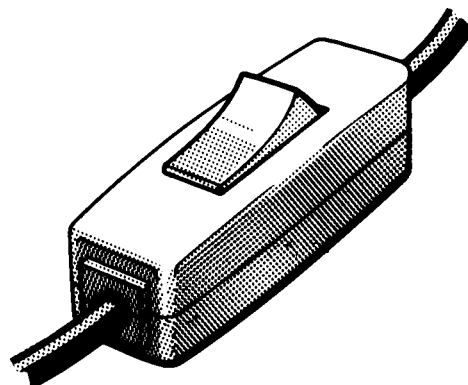
### 4. Hexagon key for the drive wheel of the step motor.

To be used according to instructions on pages 35  
and 4.



### 5. Adjustment key for setting the lowest speed of the machine.

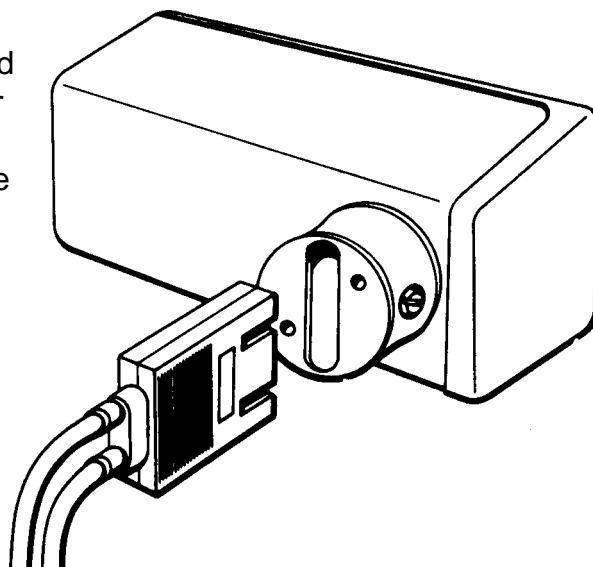
To be used according to instructions on page 33.

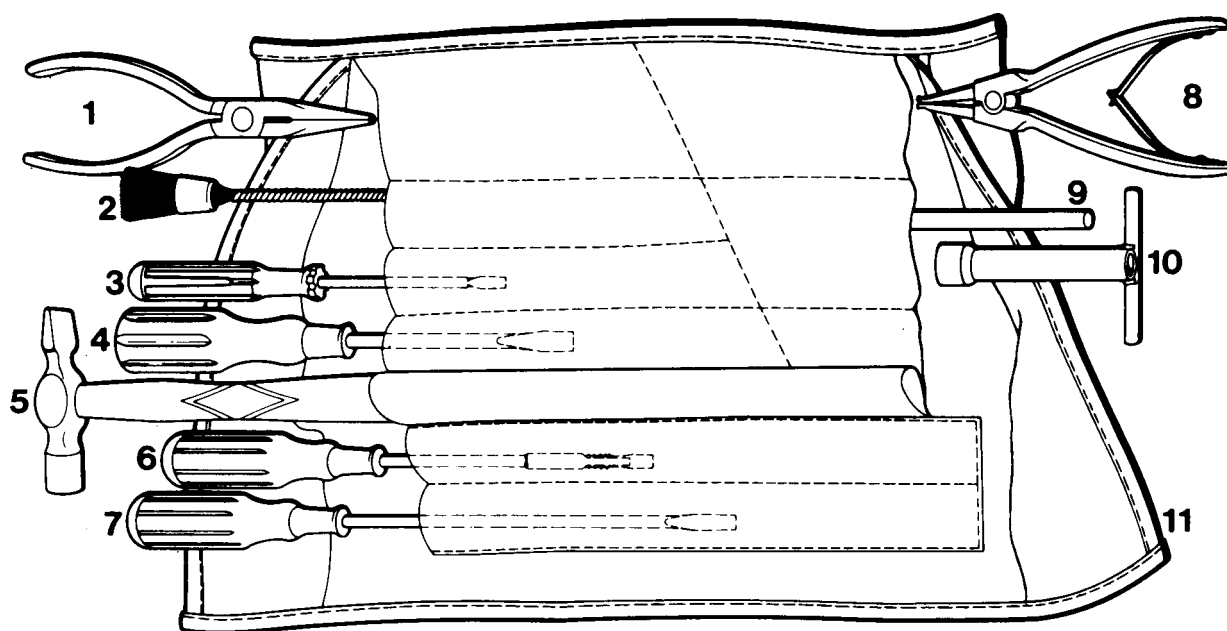


### Motor cover

The wiring in the terminal board will be exposed when removing the rear cover. The motor cover must always be used for safety reasons if the machine is connected to the electricity, after the removal of the rear cover.

Ordering No. 411 5862-01.



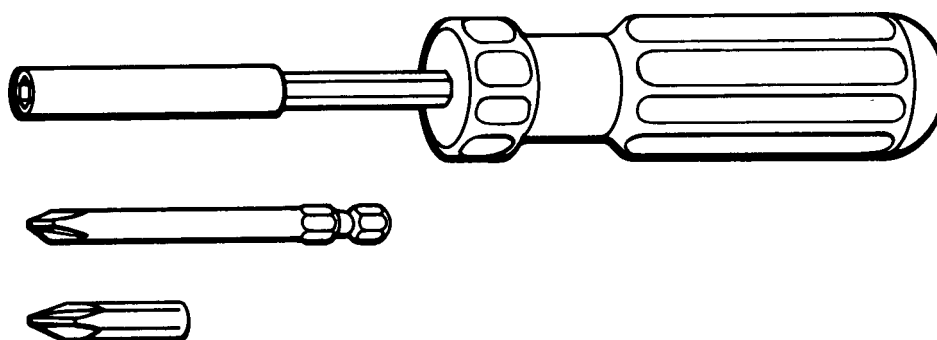


Tool set. Ordering No. 411 1921-01 containing the following details:

- |                                       |                           |
|---------------------------------------|---------------------------|
| 1. Flat-nose pliers with wire cutter. | Ordering No. 414 4906-01. |
| 2. Brush with steel wire shaft        | Ordering No. 401 5016-01. |
| 3. Screwdriver with glow lamp         | Ordering No. 411 1904-01. |
| 4. Screwdriver. Wide CI Fall          | Ordering No. 411 1901-01. |
| 5. Hammer. Tors No. 1                 | Ordering No. 411 1905-01. |
| 6. Screwdriver with screw holder      | Ordering No. 411 1903-01. |
| 7. Screwdriver. Long CI Fall          | Ordering No. 411 1902-01. |
| 8. Pliers for clamping ring           | Ordering No. 411 1910-01. |
| 9. Box spanner, See page 16           | Ordering No. 411 1907-01. |
| 10. Tool-case                         | Ordering No. 411 1915-01. |

In addition a Philip screwdriver may also be ordered.

Philip screwdriver with two  
separate heads Ordering No. 411 5433-01.



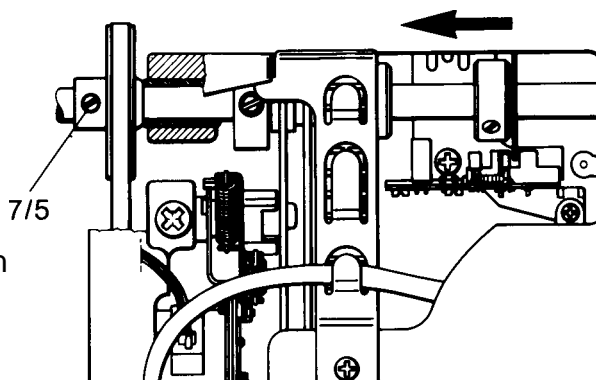
Philip screwdriver with fixed head      Ordering No. 411 1922-01.

## The arm shaft, axial play

The axial bearing should enable the shaft to run freely during the whole turn and there should not be any axial play.

### Adjustment

Set the thread take-up lever at the lowest position, remove the handwheel and then take away the belt guard. Loosen the stop screws 7/5 on the belt wheel. Press the arm shaft with one hand in the direction of the arrow and push the belt wheel in the opposite direction. Then tighten the stop screws, commencing with the one which is touching the milled plate on the arm shaft. Check that the arm shaft runs freely during the whole turn and that there is no axial play. Replace the belt guard and handwheel, making sure that the thread take-up lever is at the lowest position and the metal latch on the handwheel points upwards.

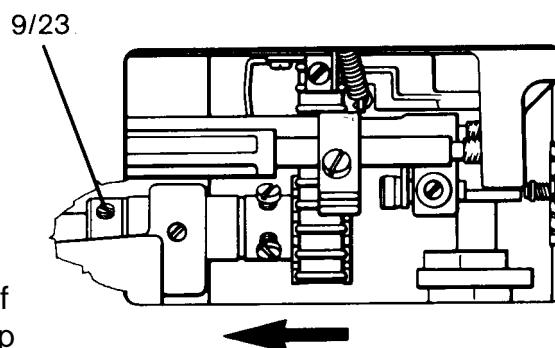


## The lower shaft, axial play

The axial bearing should enable the shaft to run 9/23 freely during the whole turn and there should not be any axial play.

### Adjustment

Remove the cover plate 5/13 on the underneath of the base plate. Loosen the stop screws in the stop ring. Then press the chain wheel in the direction of the arrow and the stop ring in the opposite direction. Tighten the stop screws.



## The arm shaft circuit

### The zig-zag movement of the needle

#### Requirements

The side movement of the needle should not commence until the needle tip is 5,5 mm above the level of the stitch plate.

#### Check

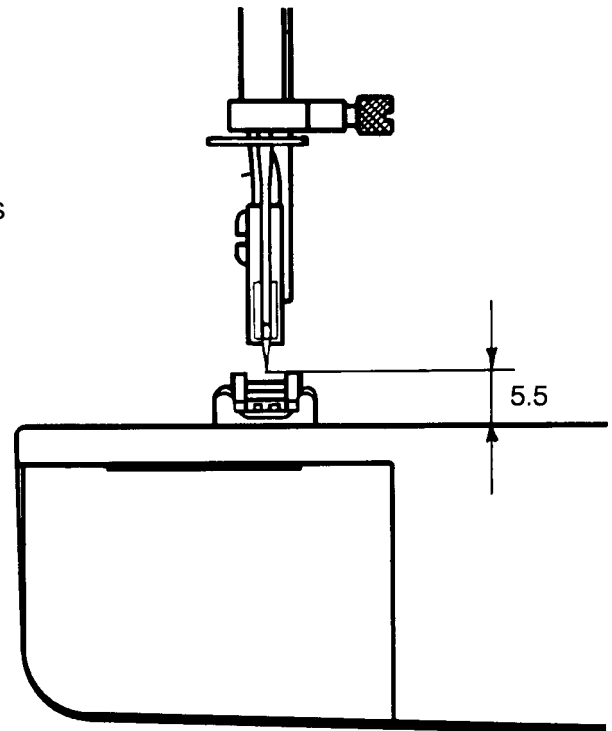
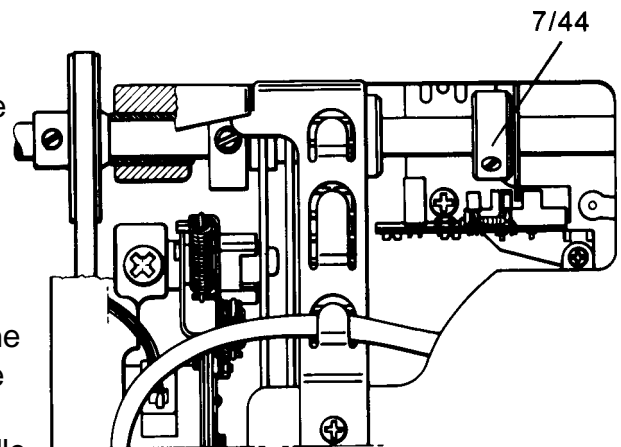
First check the height setting of the needle.

See page 22.

Turn on the main switch. Set the machine at the maximum stitch width for zig-zag. Remove the sole from the holder and place it on the stitch plate. Slowly turn the handwheel until the needle rises, observing the needle. Stop turning the handwheel just as the needle has moved sideways. Test with the sole. The needle tip should be able to pass just over the highest part of the sole.

#### Adjustment

Loosen the screw 7/44 in the screen and turn the screen until the correct needle clearance is obtained. The clearance will increase if the screen is turned towards the working direction of the arm shaft.



## The needle bar frame

*The center position of the needle at right angles to the feeding direction.*

### Requirements

The needle shall be in the centre of the needle hole in the stitch plate.

### Adjustment

Set the needle at the highest position. Turn on the main switch five-six times and check that the needle stops at the same position (Control of the calibration of the step motor). If this is not the case, see page 36. If, it stops at the same position, turn the handwheel until the needle eye is at the same level as the stitch plate. Remove the cassette and unscrew the screw (4/43), which holds the front panel in place. Press the front panel forwards and remove it.

Insert the special screwdriver (Adam key) into the opening for the thread take-up lever and loosen the set screw (4/7). The shaft (8/4) which supports the needle bar frame is eccentric.

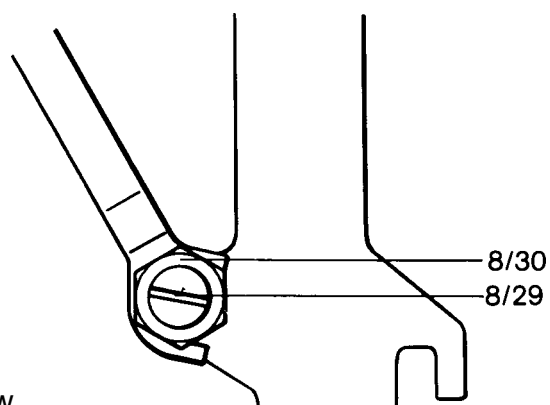
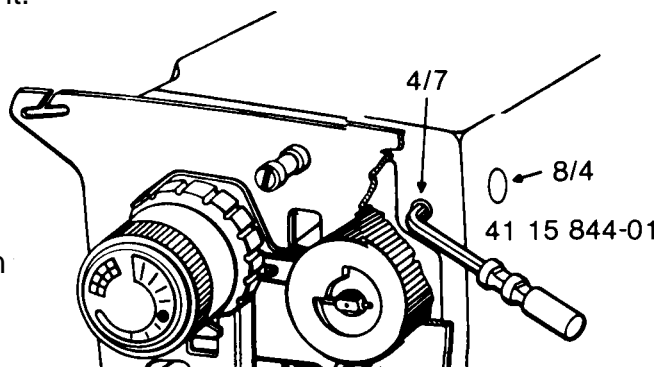
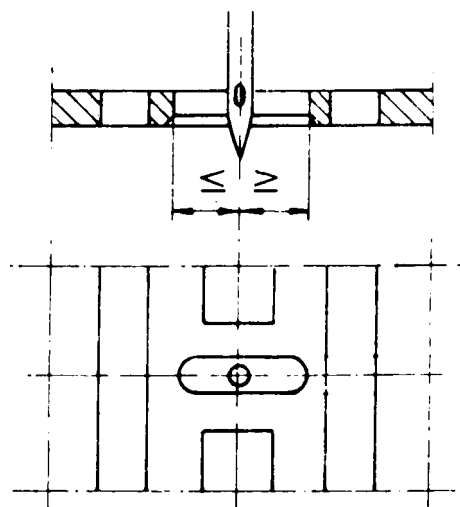
Hold the needle bar in the feeding direction and turn the shaft (8/4) carefully, by means of a screwdriver. Investigate if the required needle position can be obtained. If so, fix the shaft with stop screw (4/7).

### Comments

If the shaft (8/4) is shifted axially, this will affect the needle position in the feeding direction.

If the required needle position cannot be obtained, fix the shaft at a middle position and adjust the needle position as follows:

Remove the rear cover. Fit the box spanner 411 1907-01 on the nut (8/30) and loosen the screw (8/29) in the centre of the nut. Turn the box spanner until the required needle position is obtained. Tighten the screw.





## The needle bar frame

*Setting the needle in the feeding direction.*

### Requirements

The needle should be centred in relation to the needle hole in the stitch plate.

### Adjustment

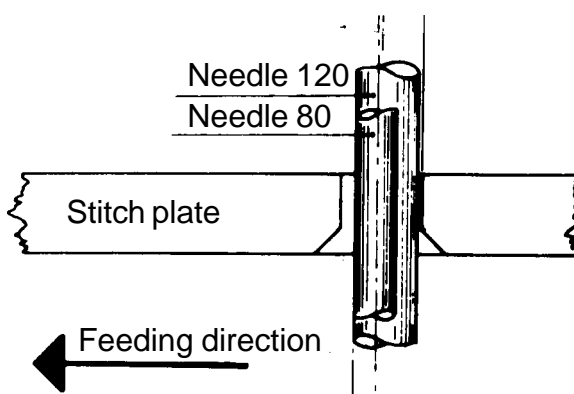
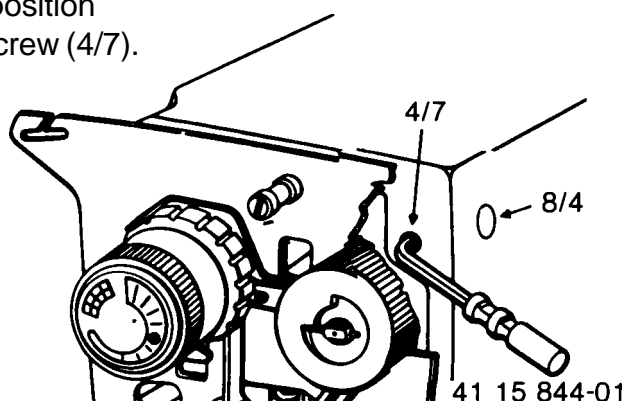
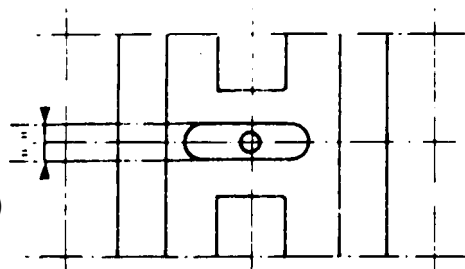
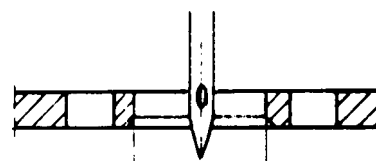
Connect the machine and turn on the main switch, Turn the handwheel until the needle is at the same level as the stitch plate. Remove the cassette and unscrew the screw (4/43) which holds the front panel in place. Press the front panel forwards and remove it. Insert the special screwdriver (Adam key) 411 5844-01 into the opening for the thread take-up lever and loosen the stop screw (4/7). The shaft (8/4) which supports the needle bar frame can then be shifted front to rear until the required needle position is obtained. Retighten the shaft with the set screw (4/7).

### Comment 1

The shaft is eccentric and if turned, it affects the needle position at right angles to the feeding direction.

### Comment 2

The distance between the centre of the needle and the shank varies with the size of the needle. In order that needle 120 will not contact the front edge of the needle slot, set the needle bar in such a way that needle (90) is in the middle of the needle slot. Needle (80) will then be slightly behind the centre of the needle hole.



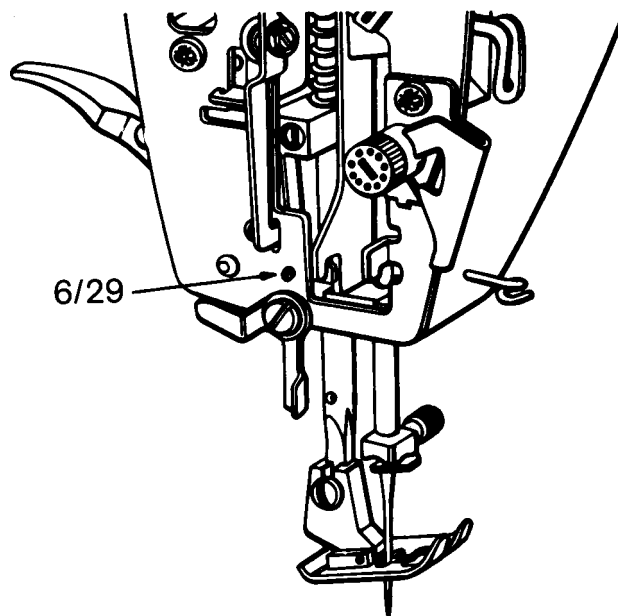
## The stop, needle bar frame

### Requirements

The stop must not prevent the needle reaching the full zig-zag but should stop the needle from going outside the needle slot in the stitch plate.

### Check and adjustment

Connect the machine and turn on the main switch. Turn the handwheel until the needle is at the highest position. Insert the service cassette and press the key under 140, i.e. so that 5.0 is indicated in the digital window. Turn the handwheel 2-3 revolutions. The needle will move to a left-hand position, which is a cog division outside the left zig-zag position. Set the stop in the face plate by means of the screw (6/29) with the least possible play. Observe the movement of the needle, press the button for straight stitching and set the left starting position. Check that the needle bar frame has slight play against the stop. Press the mirroring button and check the right-hand position in a corresponding way.



## The gap between the hook and the needle

### Requirements

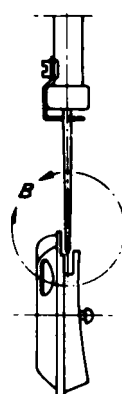
Remove the hook cover.

Connect the machine and turn on the main switch. Insert the service needle No.

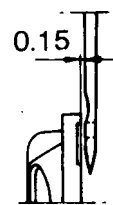
411 5818-01 into the needle bar. Lay the machine on the table on its back.

When the tip of the hook is in front of the centre of the needle, as shown in the illustration press the hook against the driver. The gap between the needle and the hook should be as small as possible.

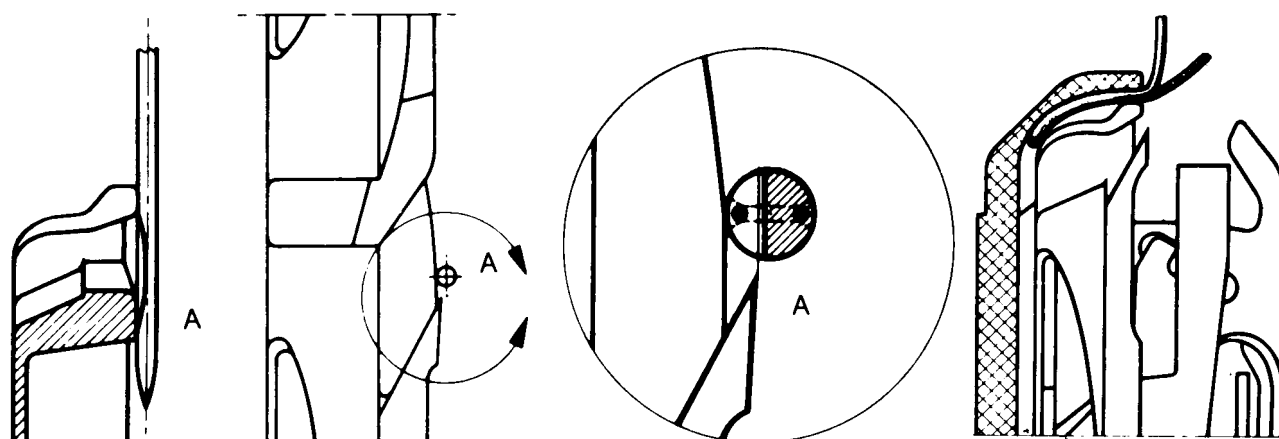
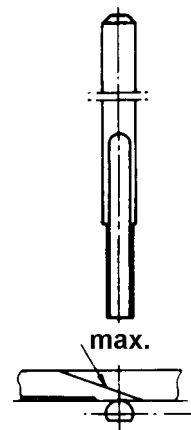
Insert the setting needle No. 411 5800-01 in the needle bar and check that the hook can pass. If the point of the hook contacts the needle the gap is at max. See Fig 2.



Setting  
needle  
Gap



View B  
Scale 2:1



### Comments

The hook comes into contact with the needle at point A, picture 3, i.e. the part of the hook which is under the tip of the hook, the so-called needle support. The hook, furthermore, is made in such a way that the top lies appr. 0.05 mm in front of this needle support.

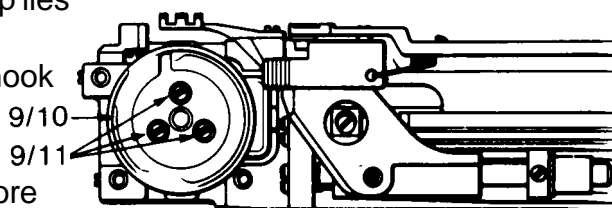
To enable the thread loop to go between the hook and the driver, according to illustration 4, a certain axial movement must be possible.

Contact between needle and hook can therefore result and this causes a sound, which can be heard if the machine is running without thread. This contact damages neither the hook nor the needle, as long as a needle with a groove according to system 705 H is used.

### Adjustment

Setting according to Requirements.

Turn the handwheel until the needle is at the highest position. The slot in the driver is now in the middle, underneath the feed dog. Undo the



three screws (9/16) which hold the hook cover-remover the hook cover and the hook. Then undo the three screws (9/11) in the driver, (9/10) and remove it. The position of the driver is adjusted by removing or adding one or several washers (9/8). Note the position of the slot in the driver. Then check "The gap between the driver and the hook cover".

Spare parts: See RA, page 9!

# Setting the timing of the hook in relation to the needle

## Requirements

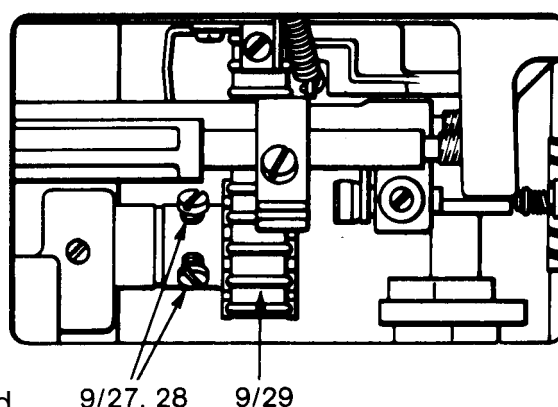
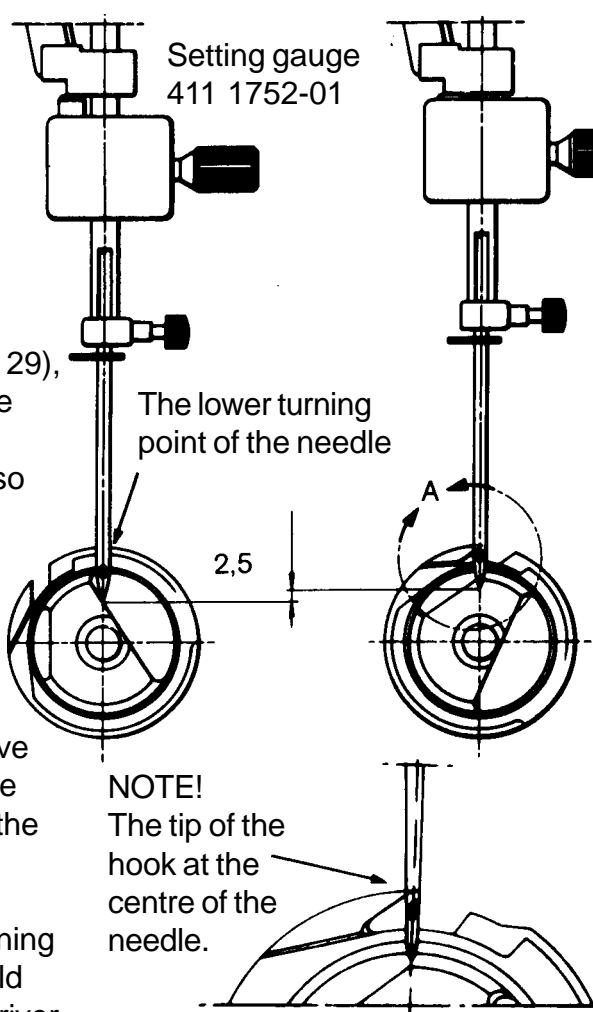
Connect the machine and turn on the main switch. As the needle is moving upwards the tip of the hook should pass the centre of the needle when the needle is 2.5 mm above the lower turning position (the distance for forming the loop).

## Adjustment

Remove the cover (5/13) under the base plate. There are three screws on the pulley (9/27, 28, 29), one untreated and two black ones. Unscrew the untreated screw and one of the black ones completely, then loosen the other black screw so that the lower shaft is still transported when the handwheel is turned.

Turn the handwheel until the needle is at the lower turning position. Place the setting gauge 411 1752 on the needle bar. Push the gauge up until the spring-loaded stud just touches the needle bar frame and tighten the screw. Remove the hook cover (9/15). Turn the handwheel in the same direction as the machine is running until the spring-loaded stud rests against its stop in the gauge, according to the right-hand figure. The needle has now moved up 2.5 mm from the turning position (the distance for forming the loop). Hold the handwheel fast and turn the hook and the driver so that the tip of the hook comes in front of the centre of the needle. Screw fast one of the black screws.

Turn the handwheel in the opposite direction until the needle returns to the lower turning position. Hold the hook back with one finger, so that it is pushed downwards and backwards, and turn the handwheel in the same direction as the machine is running. When the stud on the setting gauge is once again resting against its stop, the tip of the hook should be in the centre of the needle. When tightening the screws on the pulley, the untreated screw, which is a tipped screw, should change places with the black screw which was unscrewed earlier. Otherwise there is a risk that the untreated screw returns to its previous position. Fit on the hook cover and the cover under the base plate.



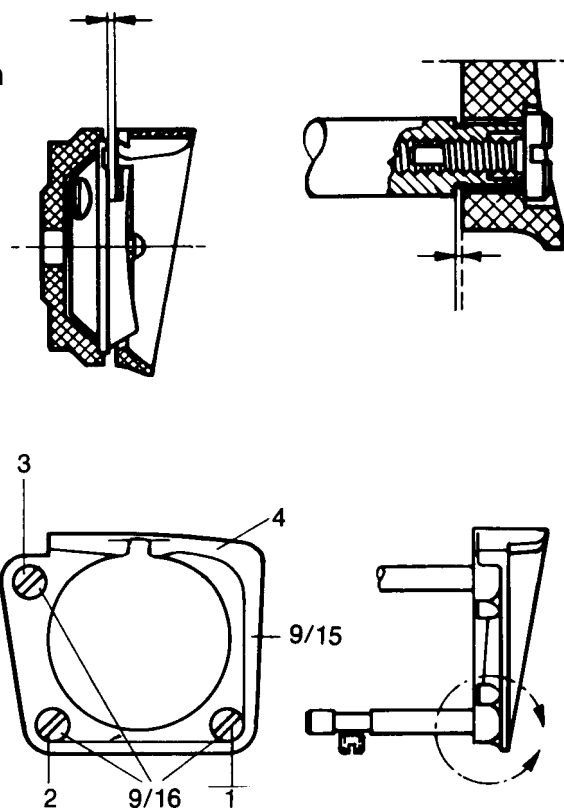
## The gap between the hook cover and driver

The gap between the hook cover and the driver should be such that when the hook is exchanged for the hook clearance gauge 401 1649 or 411 1635, the gauge should have no play but can be turned.

### Adjustment

Dismantle the hook cover (9/15) and change the sewing hook for gauge 411 1649 or 411 1635. Reassemble the hook cover. Loosen the three screws (9/14) which fasten the holders to the free arm. Check that the holders move easily in their holes in the free arm. The gap between the hook cover and the driver is adjusted by displacing the holders in the appropriate direction. This is done in two stages.

Begin with the holders (1 and 3). These are adjusted simultaneously by carefully pushing the shoulder screws (9/16) with the fingertips until they rest against the hook cover in the cover holes. The two holders should then be fastened to the arm by means of the screws (9/14). Then adjust the height of the holder (2). To avoid too much clearance (at point No. 4) in the hook, light pressure should be applied at this point on the hook cover instead of on the holder (2). This ensures that the holder (2) is lifted up somewhat. The holder should then be fastened by means of the screw (9/14). Thereafter, check that the correct clearance is attained. There should be slight resistance when turning the gauge.



Spare parts: See RA, page 9.

## The upper position of the needle bar

### Requirements

When the tip of the hook passes the centre of the needle, the gap between the tip and the upper edge of the needle eye should be 1.5 mm.

### Comments

The gap between the tip of the hook and the needle eye is influenced by the timing of the hook in relation to the needle. Check according to page 20 before any adjustment is made.

### Adjustment

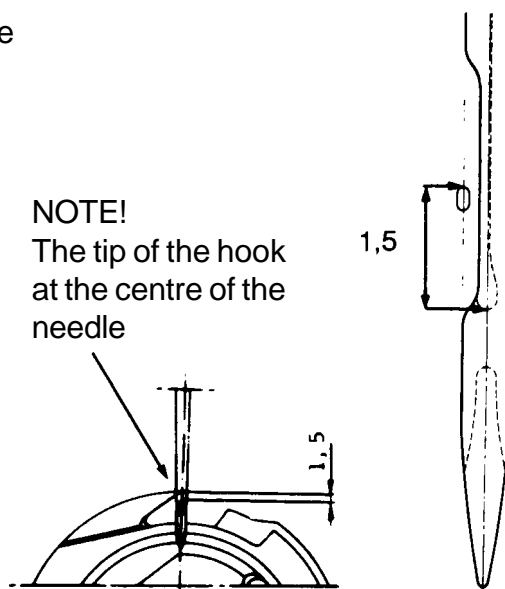
Remove the front cover.

The catch located under the lower edge of the front cover should be drawn downwards and the lower part of the cover lifted out from the machine. The cover can now be lifted upwards, so that it releases from the upper shoulder screw. Press the button for straight stitching. Turn the handwheel until the needle is at the lower turning position. Push the hook downwards and then hold it fast, so that the catch of the hook rests against the left side of the driver slot. Turn the handwheel until the tip of the hook reaches the centre of the needle. Loosen the screw (8/34) on the crank rod pin. Move the needle bar axially until the gap between the upper edge of the needle eye and the tip of the hook is 1.5 mm. Before tightening the screw (8/34) check that the needle eye is at right angles to the hook.

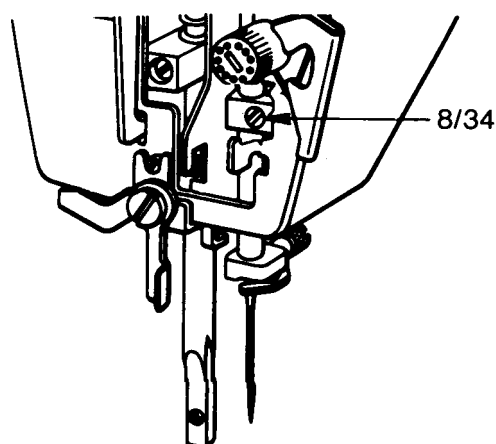
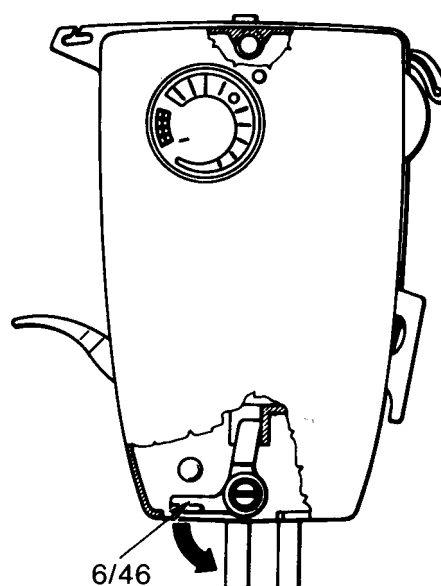
### Comments

As the needle bar is made in the form of a tube, the screw must not be tightened too hard. There is a risk of the needle bar becoming deformed and thereby moving stiffly in its bearings.

Spare parts: See RA page 8.



Setting of the upper position of the needle



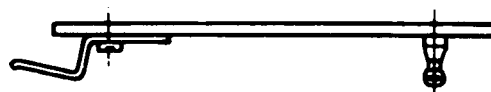
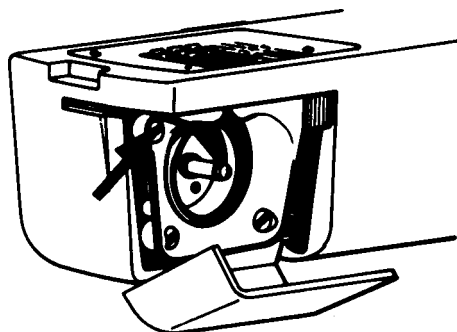
## The stitch plate

### Requirements

The stitch plate and sleeve should be firmly in place.

### Adjustment

Remove the stitch plate and loosen the screw (4/15) which holds the arm sleeve in position. Fix the stitch plate and adjust the arm sleeve to such a position that the recess of the arm sleeve is adjusted to the stitch plate and that the arm sleeve fits into where the arm is connected to the body of the machine. Remove the stitch plate without shifting the arm sleeve. Tighten the screw (4/15) and affix the stitch plate. The stitch plate has two fixed supports on the body and a third, comprising of a screw which is accessible where the arrow indicates. Adjust the position by means of this latter screw, so that the stitch plate is satisfactorily supported.



### Comments

The correct positioning of the stitch plate spring is necessary for the fixing of the stitch plate. The stitch plate should be exchanged if it is suspected to be faulty.

Spare parts: See RA, page 4.

Ordering No: Stitch plate 411 5628-01.

## The ratio between the position of the feed dog and the stitch plate groove.

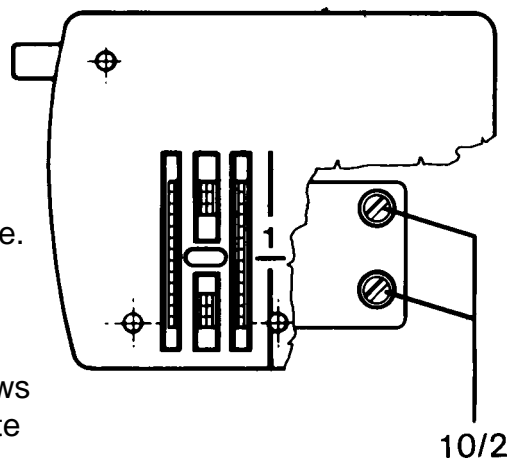
### Requirements

The feed dog shall be parallel to the stitch plate groove.

### Adjustment

Turn the handwheel until the feed dog is at the highest position. Remove the stitch plate and loosen the screws (10/2) which hold the feed dog. Replace the stitch plate and adjust the feed dog until it is parallel to the stitch plate groove. Remove the stitch plate again, without shifting the feed dog.

Tighten the screws (10/2) and check that the feed dog is correctly positioned in the stitch plate.



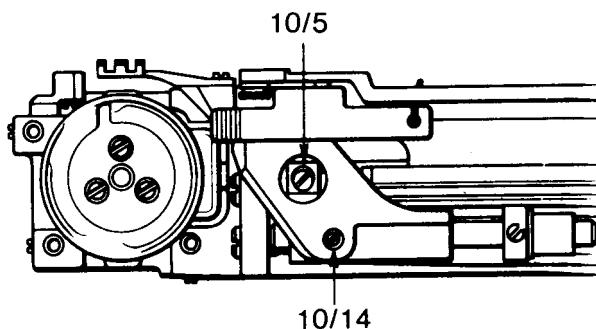
## The feed dog setting, laterally

### Requirements

The feed dog should move freely in the stitch plate groove.

### Adjustment

Remove the stitch plate, Undo the screw (4/15) and remove the arm sleeve. Put back the stitch plate on the freearm. Loosen the screw (10/14) on the feed dog supporting arm and shift the supporting arm until the feed dog moves freely in the stitch plate. Tighten the screw (10/14).



Spare parts: See RA, page 1 0.

## Movement of the feed dog

### Requirements

The feed dog must not strike against the stitch plate when the machine is set at maximum stitch length, nor at forward feeding or reverse feeding.

### Adjustment

Push the button for sewing on buttons (no. 1 cassette A). Turn the handwheel until the needle bar has passed the lower turning position and continue until it is at the upper turning position. Undo screw (10/5) and position the feed dog at the centre of the stitch plate groove. Tighten screw (10/5). Check according to above.

## The feed dog setting

### The feed lift

#### Requirements

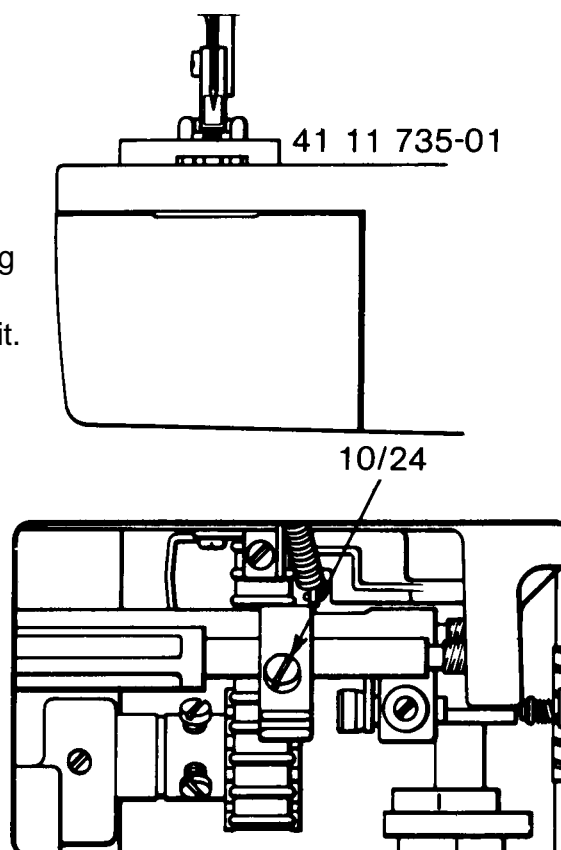
The height of the feed dog over the stitch plate should be checked with the gauge 411 1735, which should be placed under the presser foot. Push the button for sewing on buttons (no. 1 cassette A). Turn the handwheel until the feed dog reaches the highest position. The feed dog teeth should be level with the gauge, but should not lift it.

#### Adjustment

Remove the cover plate (5/13) underneath the base plate. Loosen the screw (10/24) and fit in the feed dog against the gauge. Tighten the screw (10/24).

#### Comments

With the gauge 411 1735, a feed dog height of 1 mm is obtained.



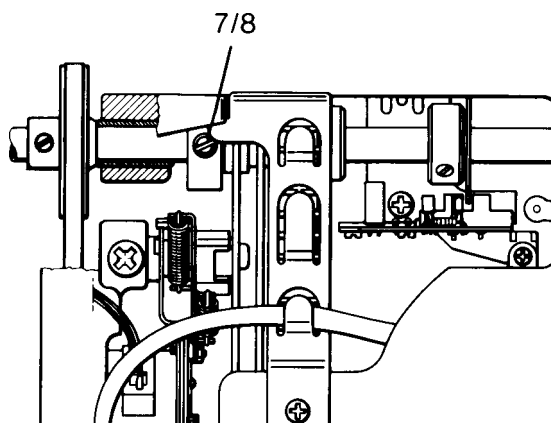


## The ratio between the setting of the feed dog and the needle (the after-feed).

Press the button for straight stitching and the button for stitch length until 6,0 is indicated. Insert a piece of paper under the presser foot and turn the handwheel until the thread take-up lever is at the highest position. Mark the paper in the needle hole of the presser foot. Turn the handwheel anti-clockwise until the machine has finished feeding and make a new mark on the paper in the needle hole of the presser foot. The distance between the marks should be 0.3-0.6 mm. This means that the machine has fed 0.3-0.6 mm after the thread take-up lever has reached the highest position. This movement of the feed dog is usually called "the after-feed".

### Adjustment

Loosen the screw (7/8) on the counter-weight of the stitch length eccentric, and hold it fixed. If the after-feed is insufficient turn the arm shaft in the working direction. Then tighten the screw (7/8).



## The feed dip

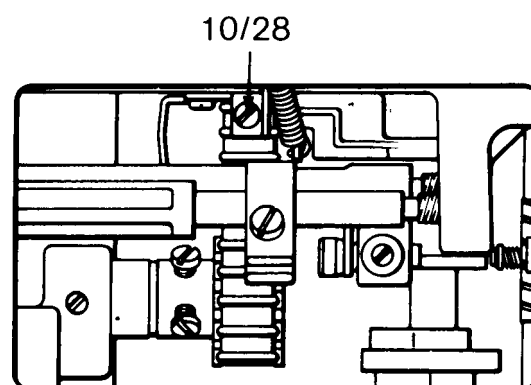
### Requirements

The machine should sound normal when the feed dog is in the feeding position and when dropped.

### Action

Remove the cover (5/13) under the base plate. While the machine is running turn the setting screw for the feed dog support (10/28) clockwise until the sound changes. Then turn the screw backwards approx. 1 turn, or until the machine is running at its normal sound.

Spare parts: See RA, page 10.



## The presser bar, tangential setting

### Requirements

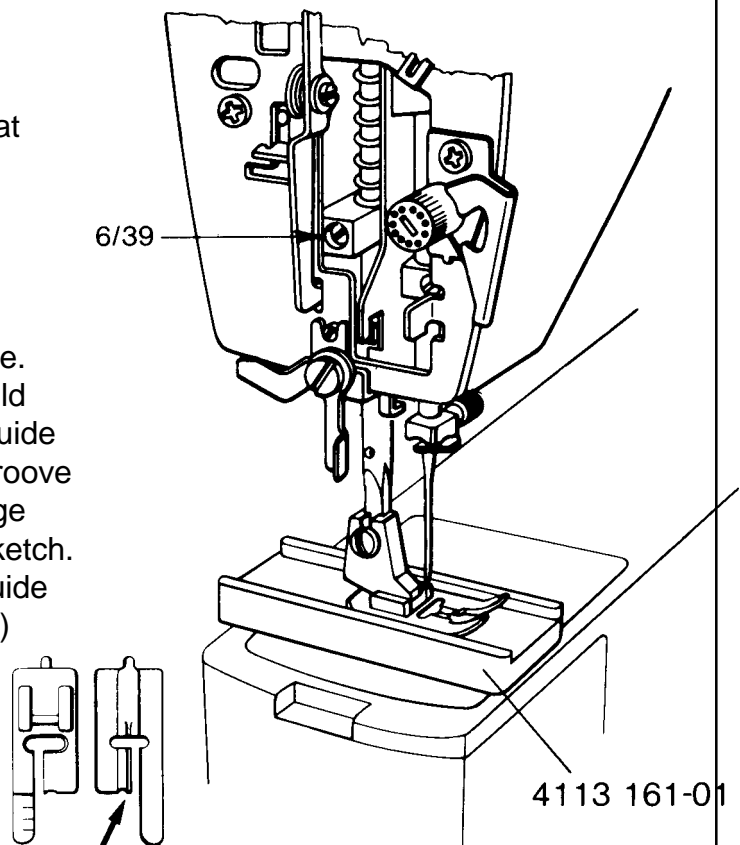
The presser bar should be set in such away that the needle hole in the presser foot coincides with the needle hole in the stitch plate.

### Adjustment

The gauge 411 3161-01 for adjustment of the presser bar should be placed on the stitch plate. Drop the feed dog. The presser bar lever should be lowered and the screw in the presser bar guide (6/39) loosened. Fit the presser foot into the groove of the gauge and position the edge of the gauge parallel with a marking line, according to the sketch. Check that the underside of the presser bar guide touches the presser bar level. The screw (6/39) should then be tightened.

### Comments

On the underside of the buttonhole foot there is a guide, which steers the fabric. If the position of the presser bar is not correct in relation to the needle, the distance between the columns will be affected.



## Pressure foot pressure

### Requirements

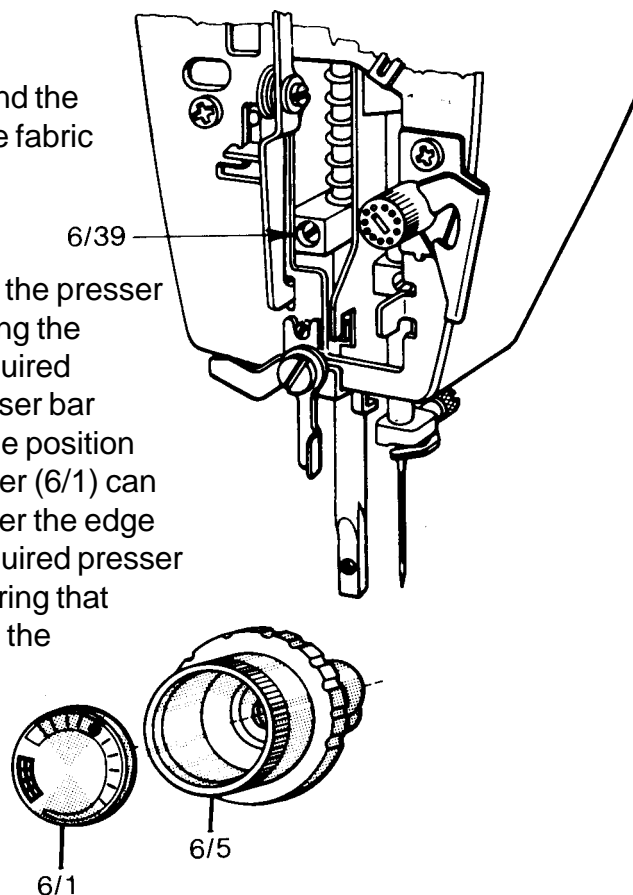
The pressure between the presser foot and the stitch plate should be sufficient to hold the fabric in place.

### Adjustment

Set the presser bar knob at red and drop the presser bar. Check that there is no seizing, by lifting the presser bar with the sole holder. If the required pressure cannot be achieved by the presser bar spring, this can be altered by changing the position of the red dot on the knob cover. This cover (6/1) can be removed by inserting a sharp tool under the edge and gently pulling it outwards. Set the required presser bar pressure and replace the cover, ensuring that the red dot is in front of the white mark on the face plate.

### Comments

How the fabric is held between the presser foot and the stitch plate plays an important role in the stitching.



Spare parts: See RA, page 6.

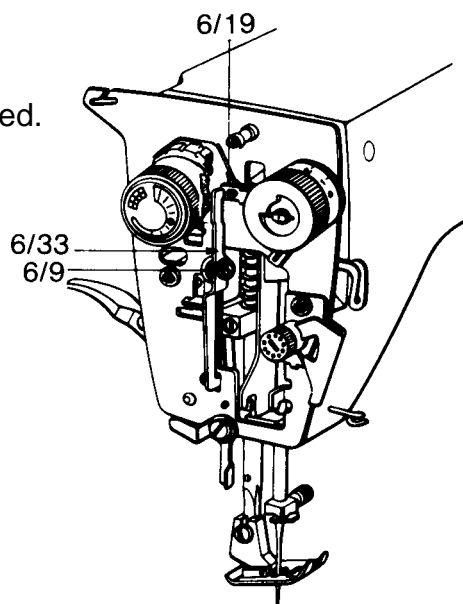
## The upper thread tension release

### Requirements

The lever (6/33), which gets its impulse from the presser bar lifter, should release the pressure on the thread tension washers, via release arm (6/19), when the presser bar is lifted, but must not touch the release arm (6/19) when the presser bar is lowered.

### Adjustment

Lower the presser foot. Turn the eccentric (6/9) until the lever (6/33) is free from the release arm (6/19). The clearance between the details should be as little as possible.



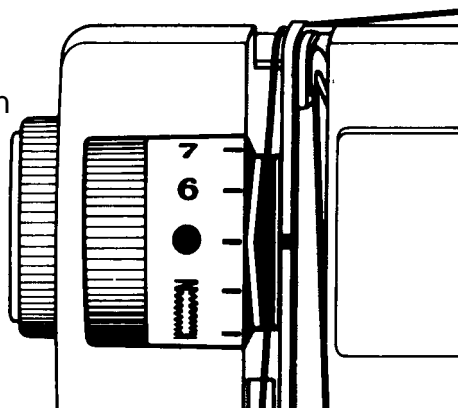
## Setting the thread tension knob

### Requirements

When the index on the thread tension knob is level with the red dot on the front plate, you should have the right tension for proper thread take-up for normal sewing.

### Adjustment

Turn the thread tension knob until the required tension is obtained. Remove the front cover. The outer part of the knob (6/22) should be drawn out and turned until the red dot is right in front of the index. When in this position push the outer part back again. Check the knob, to make sure that the grades 0-10 can be set at the index. If this is not possible, the thread tension spring (6/18) must be exchanged or spacing washers should be inserted.



### Comments

The thread tension you have when the index is level with the red dot on the front plate should only be regarded as a general indication. When sewing fabrics which are not of normal quality, and if absolutely perfect stitching is necessary, the thread tension should be adjusted according to the thread and fabric.

Spare parts: See RA, page 6.

## The thread take-up-spring

### Requirements

The thread take-up spring (6/42) should be able to move freely in the groove of the adjustment casing and be strong enough to take up the thread.

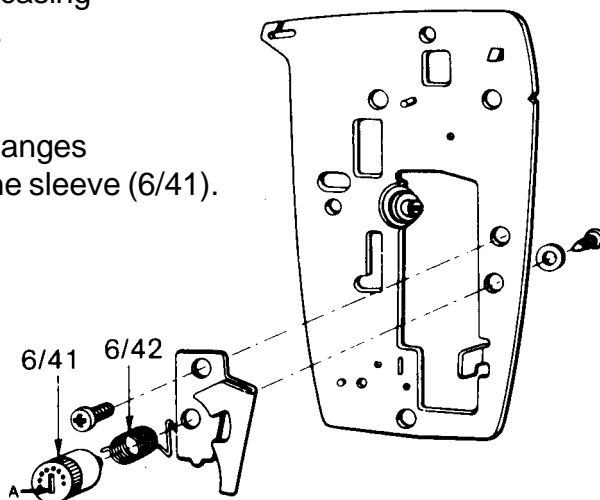
### Adjustment

The strength of the thread take-up spring changes if the rear part is shifted to another hole in the sleeve (6/41).

## The adjustment casing

### Requirements

The casing (6/41) should be so set that the thread take-up spring has finished its movement when the needle eye reaches the fabric, after a completed stitch. Check by sewing on thin fabric.



### Adjustment

The stop in the adjustment casing, i.e. the limitation of the movement of the spring, can be adjusted by means of a screwdriver, which should be applied at A.

## The thread tension of the bobbin case

### Requirements

The thread tension spring of the bobbin case shall give a thread resistance of 20-24 g when pulling the thread slowly.

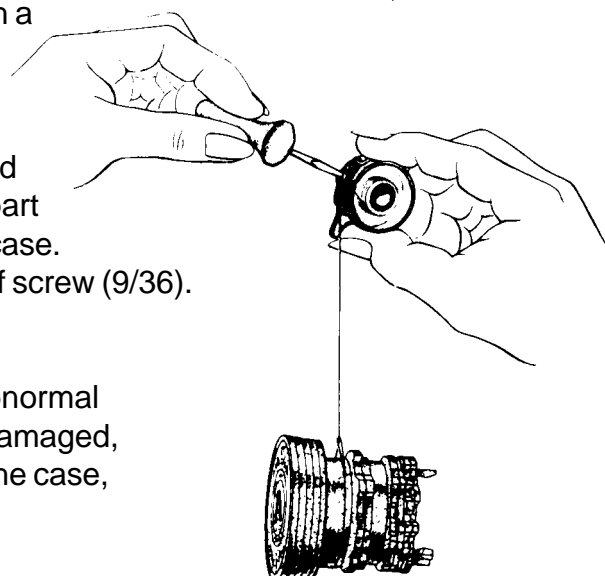
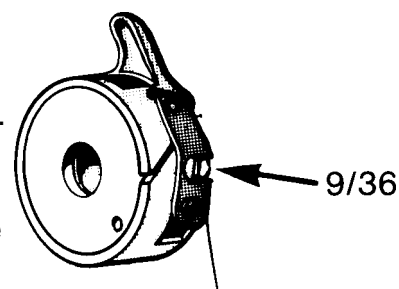
### Adjustment

Remove any loose pieces of thread or fluff which may have collected under the thread tension spring. The thread tension can be tested by using a test part with a weight of 22.9 g, e.g. a seam former. Attach the thread to the test part and hold the bobbin case, letting the thread hang vertically in the direction of the bobbin case finger. If the thread tension is correctly set, the weight of the test part should pull the thread slowly from the bobbin case. Adjustment of the tension is done by means of screw (9/36).

### Comments

If the bobbin case spring is subjected to an abnormal load (e.g. when pulling the thread) it may be damaged, thus making adjustment impossible. If this is the case, the bobbin case must be exchanged.

Spare part: Bobbin case 401 1530-02.



## The stitch length.

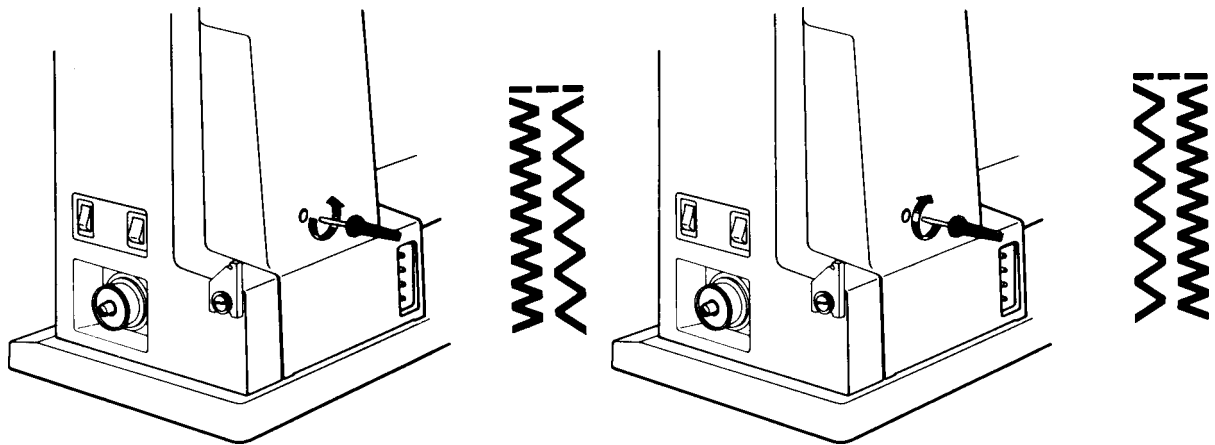
## The balance between forward and reverse feeding when sewing buttonholes.

### Requirements

Both columns of the buttonhole shall be of equal compactness when the fine adjustment knobs are at neutral position.

### Adjustment

The balance of the stitch length can be adjusted by means of a screw, which is accessible through a hole in the rear cover. The balance between forward and reverse feeding can be set according to the sketch. Test sew with A4 (flatlock). Compare page 43.



## Electronic units

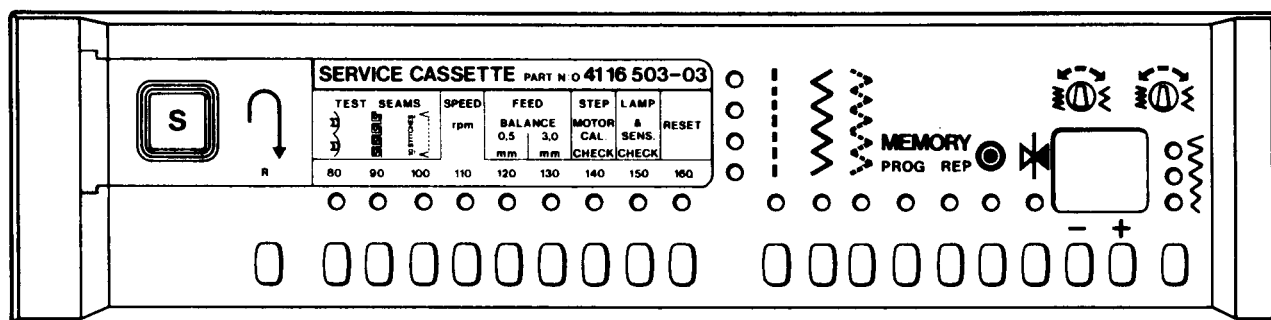
Regarding fault-finding and checking the functioning of the electronic units, refer to "Operating Instructions for Electronics Diagnoser", Ordering No.

104 8027-01 and "The Service Cassette", Ordering No. 411 6503-03. Note that "Speed control"-the stop-right function" is not covered by the diagnoser.

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## How to use the Service Cassette

Summary of the checks which can be carried out when the service cassette is inserted in the front panel.



Button  
marked

- |       |  |
|-------|--|
| R     | Check of the capacity of the step motor to re-adjust the guide (11/15) in the feeding mechanism. |
| 80-90 | The balancing between forward and reverse feeding when sewing trimotion.                         |
| 100   | Micro-computer. If 10 stitches are not obtained, the front panel should be exchanged.            |
| 110   | Lowest speed and homing speed.<br>Instructions, see page 33.                                     |
| 120   | Stitch length balance 0.5 mm.<br>Instructions, see page 43.                                      |
| 130   | Stitch length balance, 3.0 mm.<br>Instructions, see page 43.                                     |
| 140   | Stop for the needle bar frame.<br>Instructions, see page 18.                                     |
| 150   | Light diodes, digital window and arm shaft circuit.<br>Instructions, see page 38.                |
| 160   | Release of the speed control, button 110.  |

## Speed control

### The stop-right function

#### Driving of the motor

If the machine operates when the motor is connected with a spare part circuit but not when the mounted circuit is connected, remove the faulty circuit and send it in for repair.

#### Comment 1

Note that the brush holder and open wiring of the motor and the rear of the printed circuit are live as soon as the wall plug is connected. The switch does not de-electrify the printed circuit. Make it a habit, therefore, to remove the plug from the wall socket as soon as the belt guard is removed and only reconnect when it is absolutely necessary.

#### Comment 2

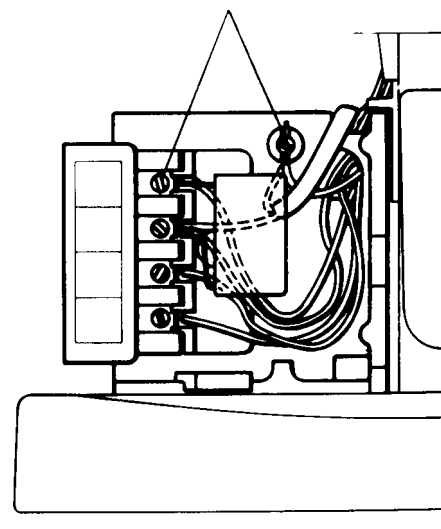
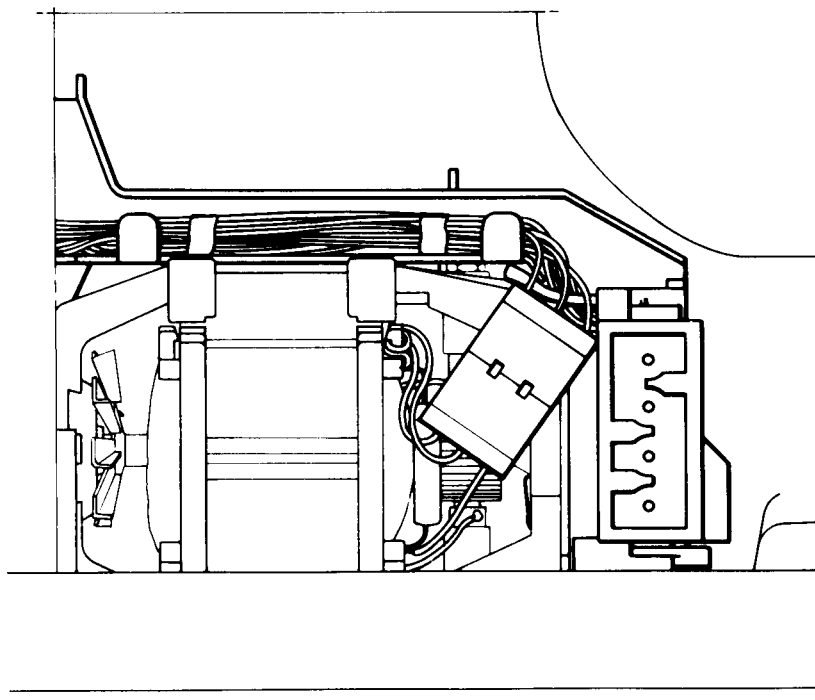
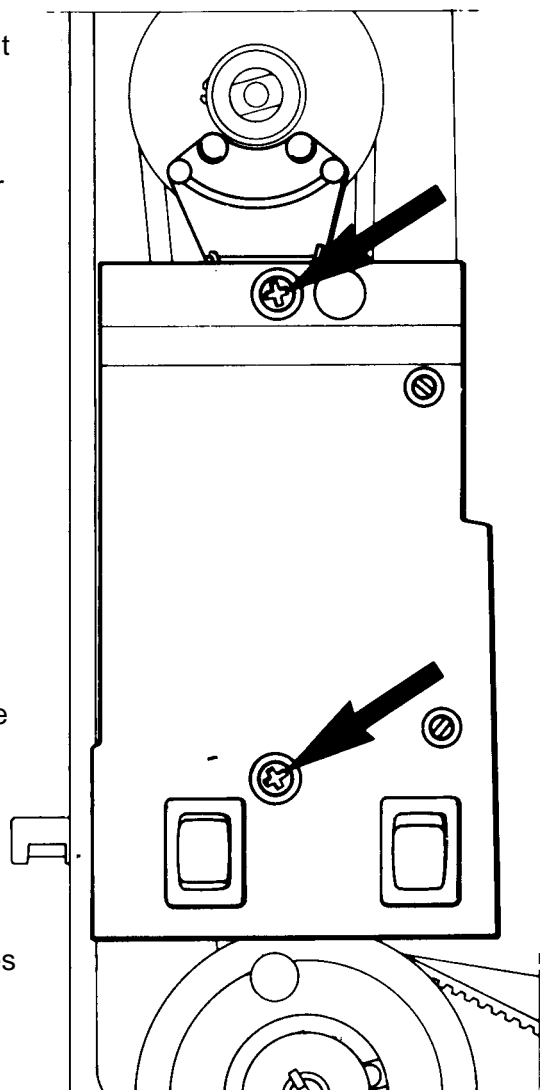
If the tube fuse is blown, this denotes that the printed circuit is faulty. Do not replace the fuse-send in the whole printed circuit for repair.

#### Removal

Loosen the 5 screws in the board which hold red, black, white, yellow and blue wires. The lighting cable and condenser (0.1 uF) should remain connected. Remove the 2 screws (the cross-grooved screws) which hold the printed circuit and separate the conductor joint at the motor. Remove the cable protector from the wires and push the wires through the hole in the terminal board.

#### Assembly

Assembly should be carried out in a corresponding way, i.e. affix the cable protector and push the 5 wires back through the hole in the terminal board. Note that the wires must be connected to their respective colours. Replace the printed circuit and press the conductor joint in.





## Speed control

### The stop-right function

*The lowest speed of the motor*

#### Requirements

The machine should manage a lowest speed of  $100^{+20}_{-0}$  r/min.

#### Action

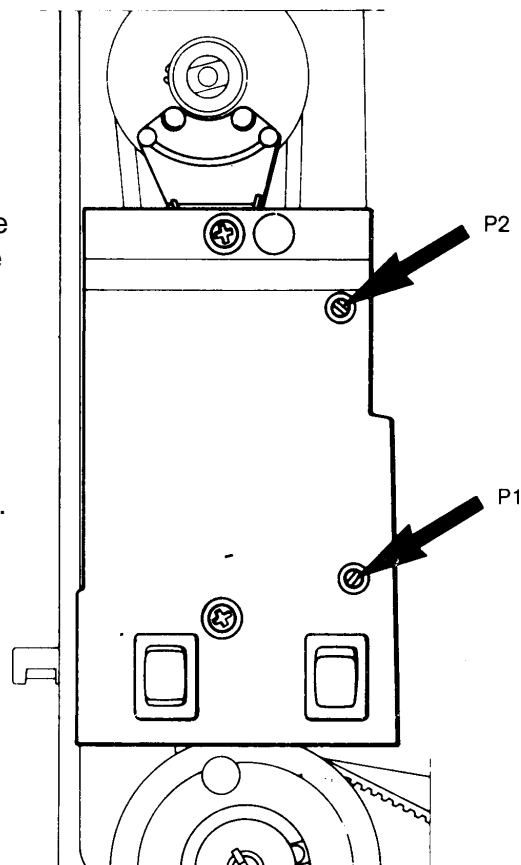
Remove the wall plug. Set the thread take-up lever at the lowest position and remove the handwheel. Remove the belt guard. Set the stop-right pushbutton at the neutral position. Connect the machine but remember that the brush holder and open wires of the motor and the rear of the printed circuit are live and unprotected, even if the main switch is turned off. Insert the service cassette. Turn on the main switch. Start the machine and let it run a few revolutions until the step motor is well in operation. Press the button under 110 (speed r/min). Depress the foot control so that the machine runs at the lowest possible speed or re-set the changeover switch if foot control with changeover switch 411 6539 is used. The illuminated light on the panel indicates the speed of the machine.

#### Adjustment

The number of revolutions can be adjusted by means of the lower potentiometer (P1). Turn the potentiometer anti-clockwise for higher speed, clockwise for lower speed.

#### Comment

There are magnetic bars on the upper part of the printed circuit which sense the position of the hand wheel. These must not come into contact with metal objects. For this reason always set the thread take-up lever at the lowest position when removing or replacing the handwheel, so that the inside plate of the handwheel cannot come into contact with the magnetic bars.



### *Homing speed of the machine*

#### Explanation

The homing speed is a measurement of the capacity of the electronics to turn the arm shaft after release of the foot control. It should be sufficient to drive the machine to the set stop-right position.

#### Action

Set the stop-right push-button to the up or down position. Remove the handwheel. Start the machine and depress the foot control so that the machine runs at the lowest possible speed or re-set the changeover switch if foot control or reset the changeover switch if foot control with changeover switch 411 6539 is used. The illuminated light on the panel indicates the speed of the machine. Release the foot control or re-set the changeover switch. The speed must not increase during the first second but a slight decrease is acceptable.

#### Adjustment

The homing speed is set by means of the upper potentiometer (P2). Higher speed is obtained by turning the potentiometer anti-clockwise, lower by turning it clockwise.

#### Comments

If the speed is too high, the machine will make extra stitches.

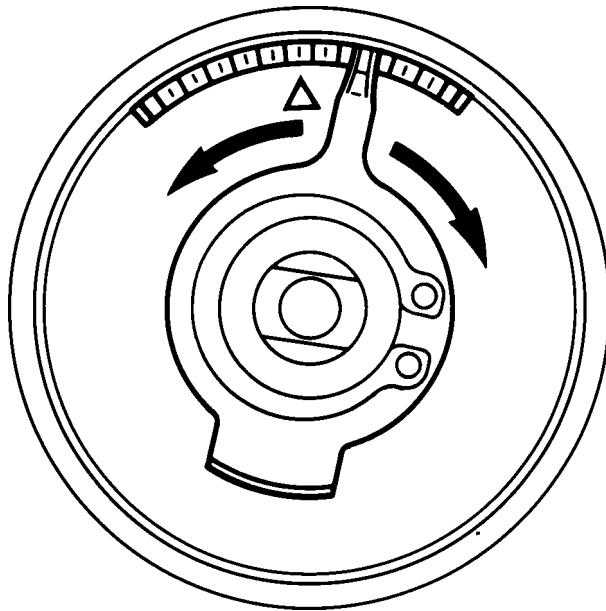
## Setting the upper stop-right position of the needle

### Requirements

When the needle stops at the upper stop-right position the clearance between the stitch plate and the needle tip should be between 14 and 9 mm (0.55"-0.35"). (The sole of the standard presser foot is 14 mm (0.55")).

### Adjustment

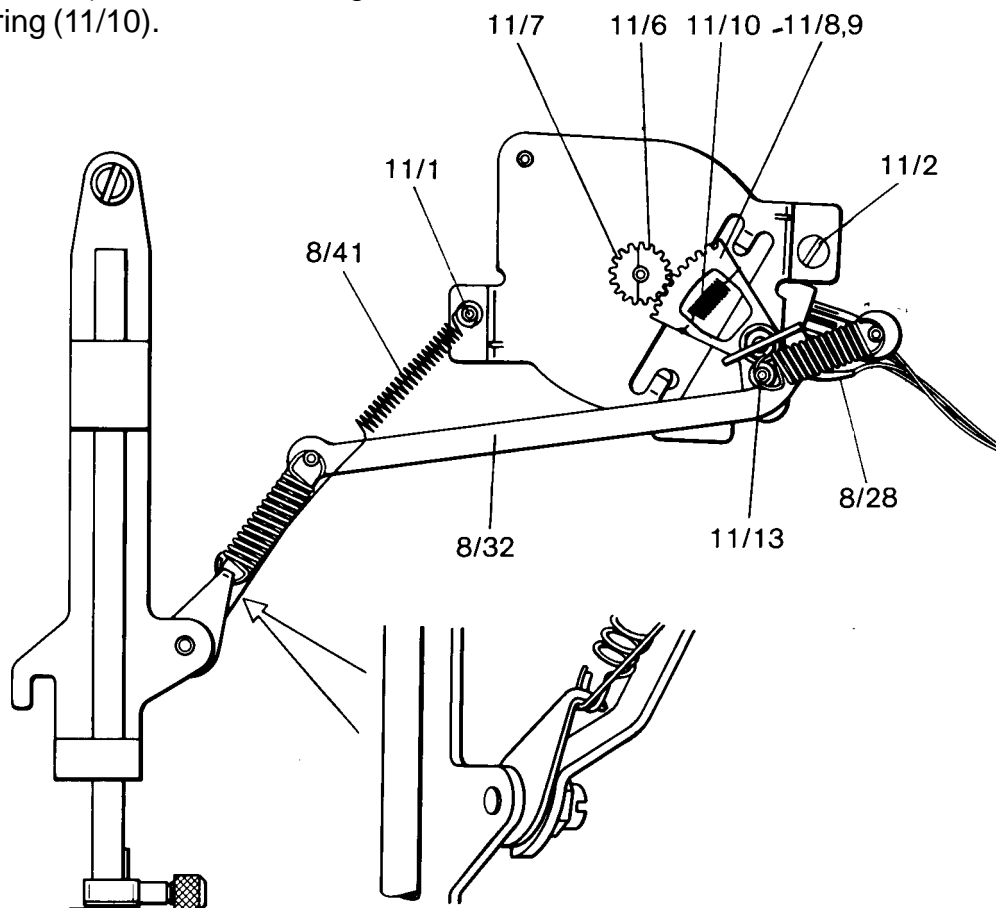
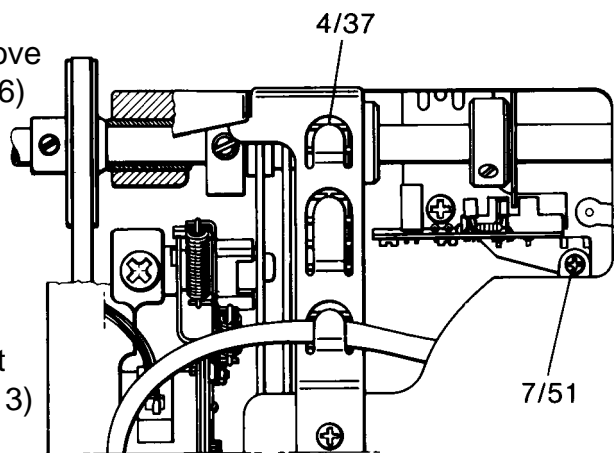
The upper stop-right position is set by moving the plate in the handwheel to a suitable position. To raise the height of the needle at the upper stop-right position, turn the screw to the right.



## The movement of the needle bar frame (zig-zag movement).

### Dismounting of the step motor

Remove the wiring to the step motor from the cable holder (4/37). Unscrew the screw (7/51) which holds the lamp holder in place and remove the holder. Observe the plastic protection (7/56) in the forward part. Loosen the spring (8/41) which is located on the long screw (11/1) by pushing it inwards on the screw. Note that the spring must not be stretched, as the spring tension is carefully calculated and may alter if the spring is stretched. Remove the spring (8/28) at the motor end of the draw rod without stretching it. Remove the plastic bushing (11/13) on the stud of the cog segment. Unscrew the screws (11/1, 11/2) which hold the step motor and remove it. (The draw rod (8/32) should be removed as necessary). Loosen the screw (11/7) in the driving gear by means of a hexagon screwdriver. To ensure that there is absolutely no play in the transmission between the driving gear of the step motor (11/6) and the cog segment, the cog segment is divided into two parts (11/8 and 11/9), which are held together by a spring (11/10).



## The movement of the needle bar frame (zig-zag movement)

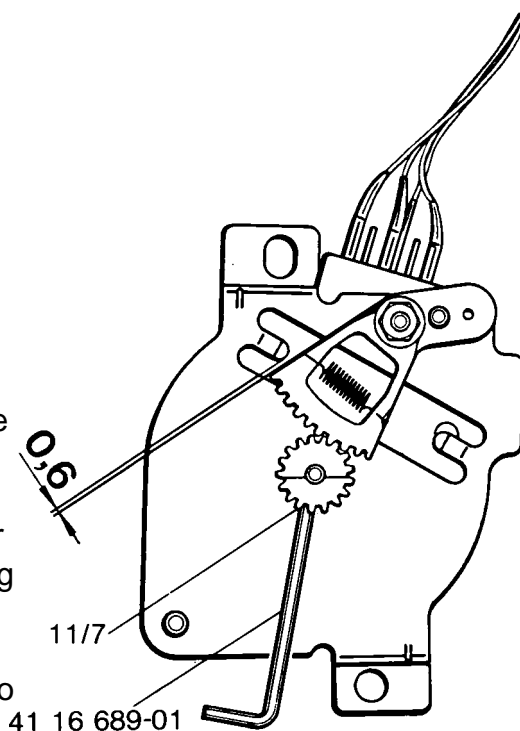
### Pre-setting of the step motor.

Do not mount the step motor but connect the flat cable from the front panel, the transformer and the step motor to the circuit in the rear cover. Note that the wire of the step motor is connected to the upper outlet on the printed circuit.

Connect the machine and turn on the main switch.

Replace the handwheel but note that the thread take-up lever shall be at the lowest position. Press the button for changing the stitch width, causing the upper light to light up. Hold the drive side of the step motor towards you and insert a 0.6 mm feeler gauge at the left projection of the segment and press the segment against the projection. Turn the handwheel 2-3 revolutions and stop with the needle in the upper position. The step motor will find its electrical starting point, i.e. the needle is in the left zig-zag position.

Retain slight axial play in the cogwheel and well tighten the set screw (11/7) in the driving gear, but do not overdo it. Press the mirroring button. The segment will go over to the right-hand position (the right-hand zigzag position of the needle). Check that the segment is not touching the projection on any side. Slow the shaft of the step motor down with your thumb and repeatedly turn the main switch on and off. Check that the step motor occupies a stable middle position.

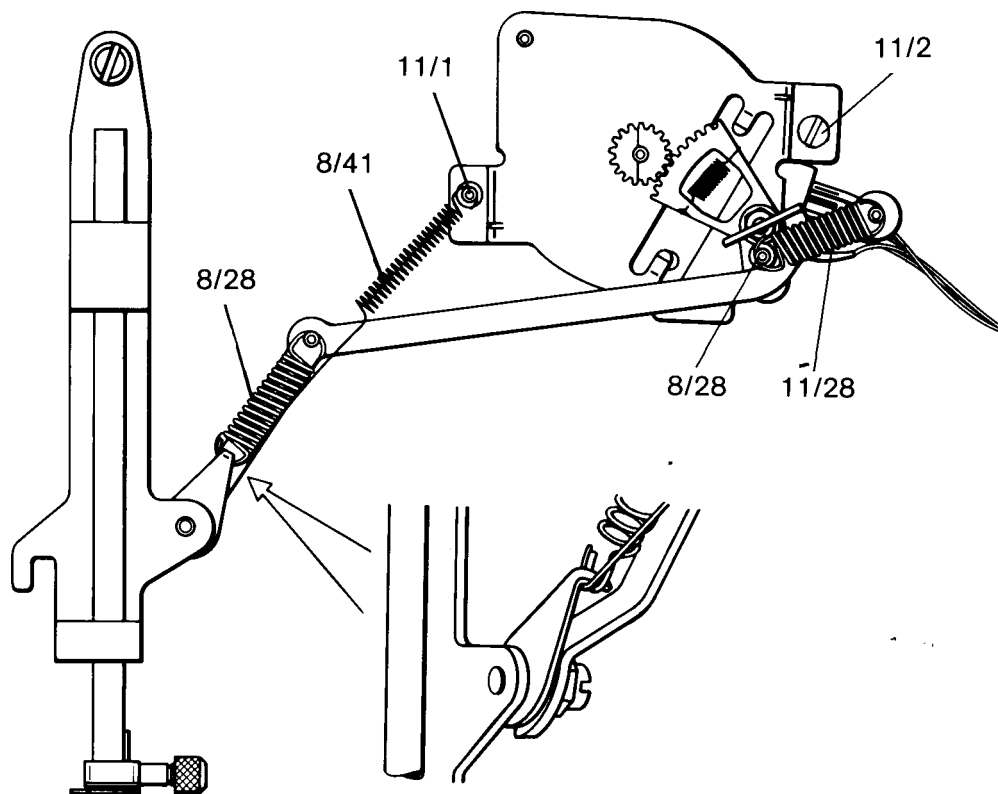


## The movement of the needle bar frame (zig-zag movement)

### Mounting of the step motor

Insert the wiring from the step motor through the opening and position the step motor. Tighten the short screw (11/2) to the left but only push in the long screw (11/1) in the right-hand hole. Insert the spring (8/28), with the open part upwards, and hook it over the stud of the spring holder. Press the long screw (11/1) forwards and hook the other end of the spring on without stretching the spring. Tighten the long screw (11/-11). forwards and hook the other end of the spring on without stretching the spring. Tighten the long screw (11/1), connect the draw rod to the segment

and place the plastic bushing (11/13) on the stud of the segment. Hook the short spring (8/28) on the stud of the segment outside the plastic bushing and on the stud of the draw rod. Check that the draw rod does not jam at the segment or at the fitting at the needle bar frame. Affix the plastic protection (7/56) with the flat side downwards on the lamp holder (7/50) and fit the lamp holder at the outlet in the arm. Tighten the screw (7/51) in the lamp holder fastening.

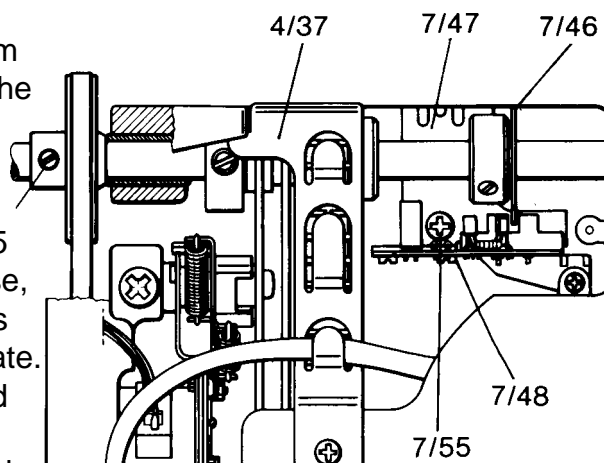


## Arm shaft circuit

### Dismounting-Mounting

There are two so-called reader forks in the arm shaft circuit (7/48) for sensing the position of the arm shaft. The black disc (7/46) on the arm shaft obstructs the movement of the step motors, e.g. there can be no zig-zag movement as long as the needle is less than 5 mm above the level of the stitch plate. Likewise, no feed changeover can take place as long as the feed dog is above the level of the stitch plate. Remove the flat cable, cable holder (4/37) and the lamp holder (7/52). The printed circuit is mounted in a metal holder (7/47), which is held in place by a stud at the front of the arm and one screw (7/55). Unscrew the screw and remove the circuit and holder. If it is necessary, a screwdriver can be inserted behind the holder to prise it off. Removal will be easier if the circuit is loosened from the holder. Dismount the circuit from the holder and return it for repair.

Mounting is done in the reverse order. Ensure that the stud is in its hole before screwing in the screw.



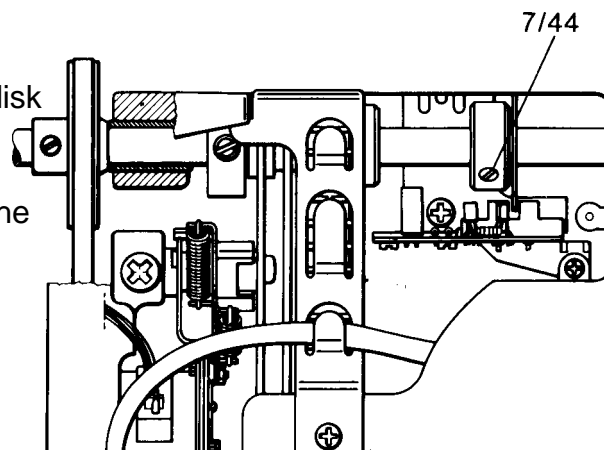
## Setting the side movement of the needle (zig-zag movement).

### Preliminary setting.

Loosen the set screw (7/44) in the arm shaft disk and turn the disk until the set screw is horizontal. Turn the hand wheel until the take-up lever is at the upper position. Check the axial position of the arm shaft disc-it should move freely in the reader fork-and tighten the screw (7/44).

### Fine adjustment.

For fine adjustment see "Requirements" and "Adjustment" on page 15.



The side movement of the needle shall commence when the needle is 5,5 mm above the level of the stitch plate-this applies to both the upward and downward passage. If the needle turns when the needle is too low, turn the screen against the working direction when the arm shaft is stationary.

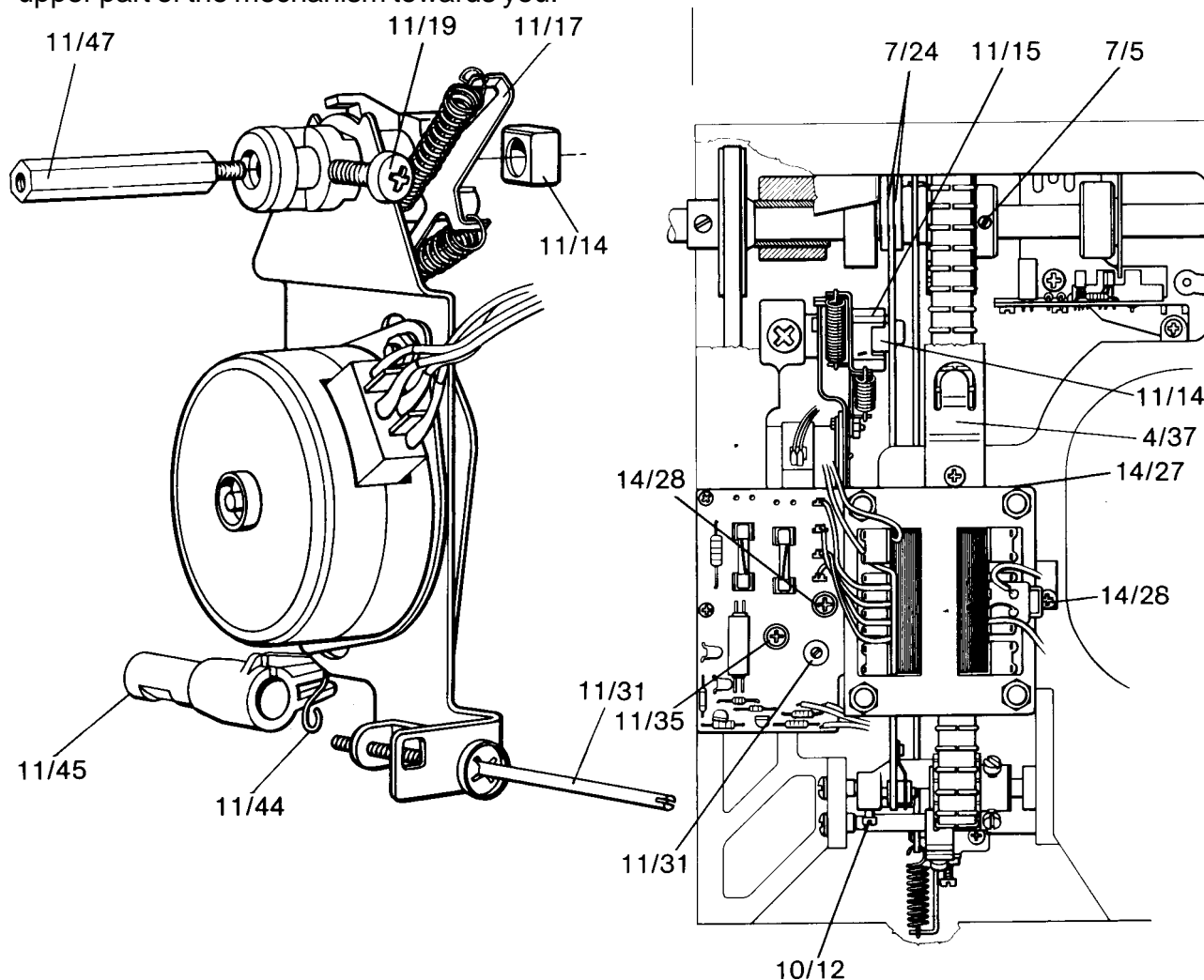
## Guiding the feeding movement

### Dismounting the step motor

Remove the handwheel. Remove the rearcover and the belt guard, loosen the stop-right circuit (4/35) and fold it to one side. Remove the cable holder (4/37). Unscrew the hexagon support (11/47) in the shaft (11/20) for the guide (11/15). Loosen the screw (7/5) in the chain wheel (7/6) and push it towards the arm shaft circuit. The plate on the shaft determines the position but it may be necessary to unscrew the screw, to enable the chain wheel to be pushed outside the plate. When doing so, see that the chain wheel is not turned and fix it on the shaft in such a position that it is easy to see which screw shall be against the plate.

Loosen the spring for the fork. Loosen the screw (10/12) in the rocker bar for the shaft stud of the fork. Keep the block (11/14) in place and push the stud out. Turn the handwheel until the screw (7/8) in the feeding eccentric (7/9) is accessible and loosen the screw. Keep the block (11/14) in place and push the fork (7/24) to the right against the chain wheel. If the block is allowed to come out with the fork, it may be more difficult to take it out of the guide. Unscrew the two screws (14/28) which hold the fastening plate of the transformer against the arm (Note, the long screw) and fold the transformer to the side. Remove the screw (11/35), which is located under the transformer, and which holds the fastening plate of the mechanism in position. Push the spring (11/44) for the feed dog lowering button (11/45) out of the score in the button. Loosen the screw (11/19) which holds the bushing to the guide shaft. Remove the block (11/14) from the guide (11/15) and push the step motor together with the guide mechanism to the right. Grip the fastening plate at the long adjustment screw (11/31), but not in the lever arm (11/17) of the cog segment, and remove the mechanism.

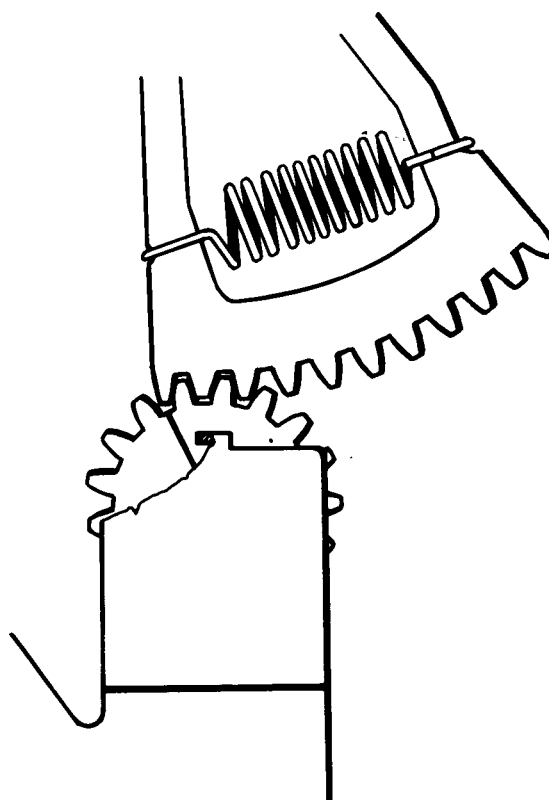
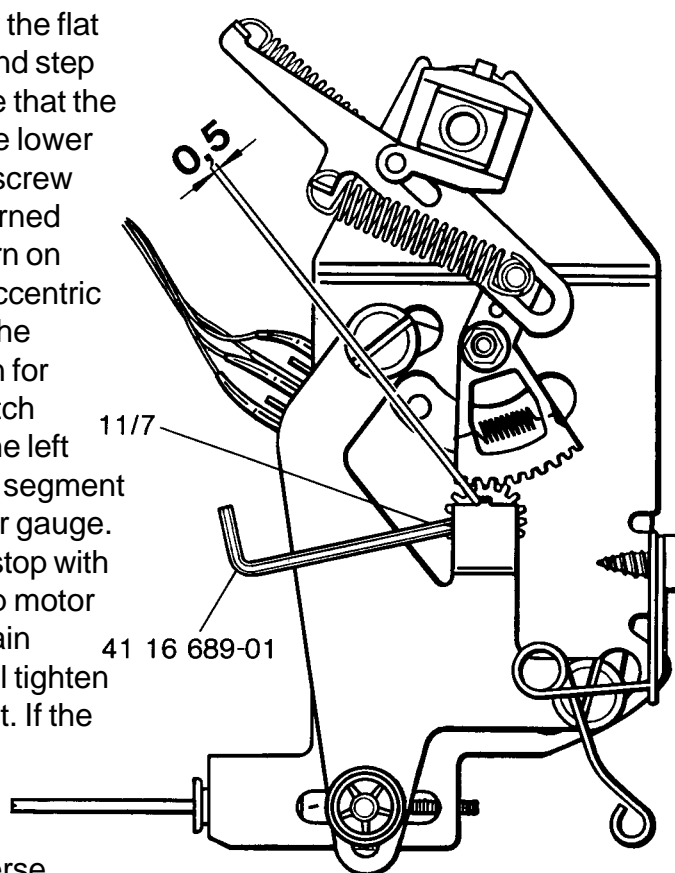
Note that the lower part of the fastening plate can pass through the lower outlet and draw the upper part of the mechanism towards you.



## Guiding of the feeding movement

### Pre-setting of the step motor

Do not mount the step motor but connect the flat cable from the front panel, transformer and step motor to the circuit in the rear cover. Note that the wire of the step motor is connected to the lower out let on the printed circuit. Loosen the screw (11/7) in the driving gear until it can be turned on its shaft. Connect the machine and turn on the main switch. Note that the fork and eccentric must be in such a position as to enable the handwheel to be turned. Press the button for straight stitching and set at maximum stitch length. Insert a 0.5 mm feeler gauge at the left stop of the drive wheel and push the cog segment until the cog wheel is resting on the feeler gauge. Turn the handwheel 2-3 revolutions and stop with the needle in the lower position. The step motor is now at its electrical starting point. Retain some axial play in the cog wheel and well tighten the stop screw (11/9), but do not overdo it. If the reverse feeding button is depressed, the segment will change sides but the stop is fixed at 6.5 mm reverse feed and the-machine will only sew 3.5 mm in reverse.





## Guiding of the feeding movement

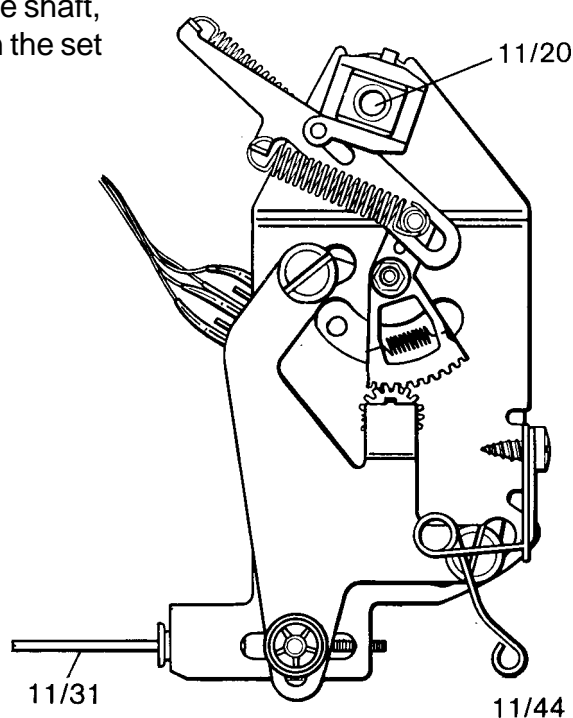
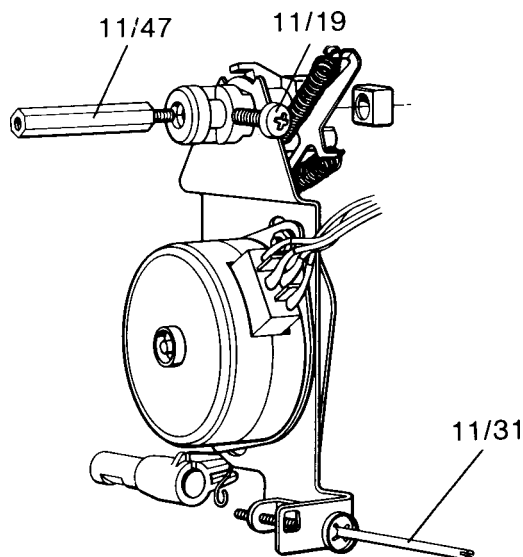
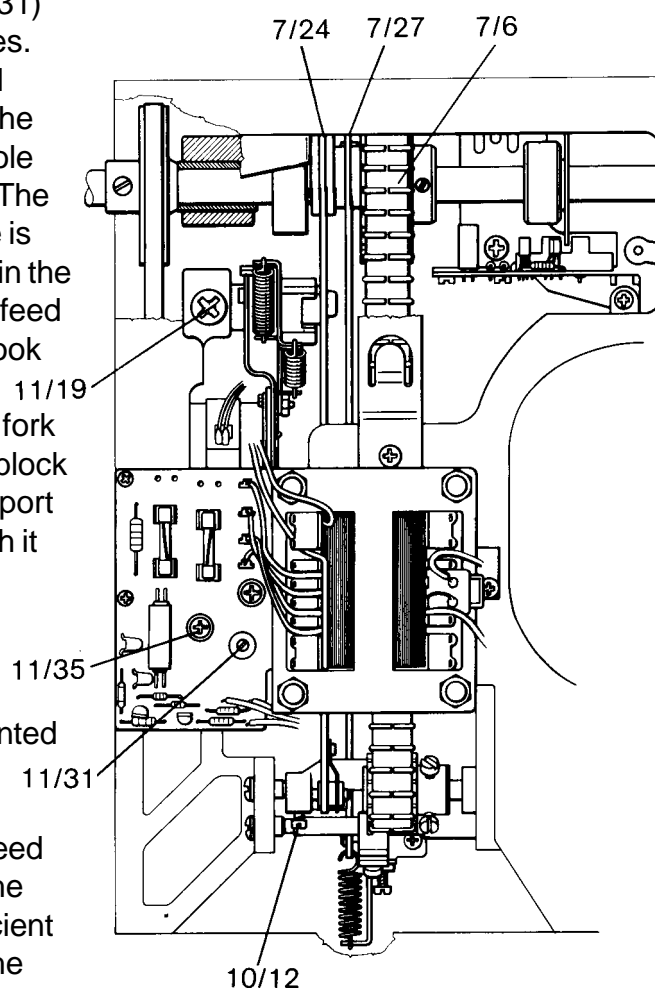
### Mounting of the step motor

Check that the long adjustment screw (11/31) is positioned to enable setting at both sides. Push the chain wheel (7/6), fork (7/24) and connecting rod (7/27) to the right. Thread the long adjustment screw through the large hole and out through the hole above the motor. The fastening shaft (11/20) in front of the guide is inserted with the bushing through the hole in the end of the arm. Hook on the spring for the feed dog lowering (11/44) and check that the hook on the feed dog lowering button is behind 11/19 the fork. Place the block on the stud of the fork and push the fork to the left, to enable the block to go in the guide. Screw the hexagon support (11/47) on the guide shaft (11/20) and push it in against the bushing.

Screw in the screw (11/35) at the long adjustment screw, Mount the Cable groove. Mount the transformer then with fastening plate (14/27). Now mount the printed circuit (4/35) for the stop-right function and check that the screen plate (7/41) in the handwheel can move freely between the reed switch and that it does not strike against the holder of the reed switch. If there is insufficient movement, loosen the screw (11/19) for the guide shaft and adjust the position of the printed circuit.

Screw in the screw (11/19) at the guide shaft. Set 0.3 mm axial play in the guide and allow the stud of the fork in the crank itself to find its position screw the set screw (10/12) into the rocker bar. Push the chain wheel on the shaft, letting the chain belt run vertically and screw in the set screw against the plate.

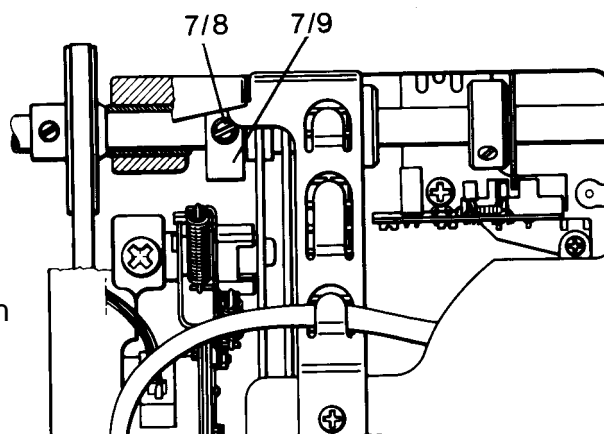
Check the movement of the chainbelt.



## Setting the feed dog movement in relation to the needle (after-feed).

### Preliminary setting

Loosen the stop screw (7/8) on the feeding eccentric (7/9) and turn the eccentric until the stop screw is horizontal. Hold the eccentric in place. Turn the handwheel until the take-up level is at the upper position. Tighten the eccentric.



### Fine adjustment

Check the after-feed at straight stitching, stitch length 6.0 mm, by drawing a line in the needle hole when the thread take-up lever is at the upper position. Then turn the handwheel until the needle tip is at the same level as the stitch plate. Draw a fresh line in the needle hole of the foot sole. The distance between these lines should be 0.3 mm-0.6 mm. Note that the handwheel might only be turned in one direction. Otherwise, play can cause faulty setting.

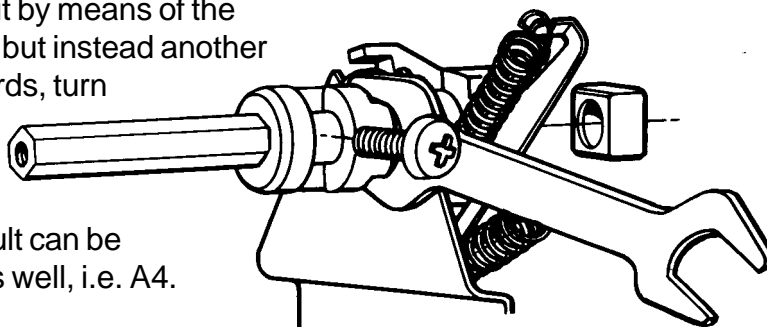
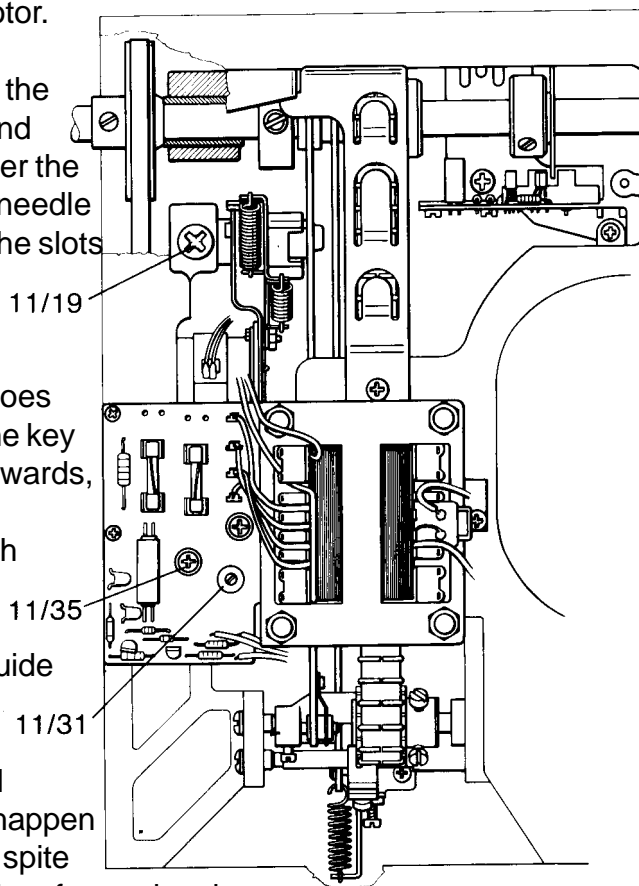
## Setting the balance between forward and reverse feeding.

The screws (11/19) at the guide shaft and (11/35) under the long adjustment screw should be loose enough to permit setting at the fastening plate of the guide motor.

Connect the machine and insert the service cassette. Turn on the main switch and press the button under 120, which gives 0.5 forward and reverse feeding. Place a piece of fabric under the presser foot and make a pencil mark at the needle hole. Put the special key (411 6679-01) on the slots of the bushing behind the guide. Run the machine at top speed for at least 30 seconds. Find a position where the needle pierces the same hole i.e. the pencil mark does not move. If the machine feeds in reverse, the key should be pressed downwards-if it feeds forwards, press it upwards.

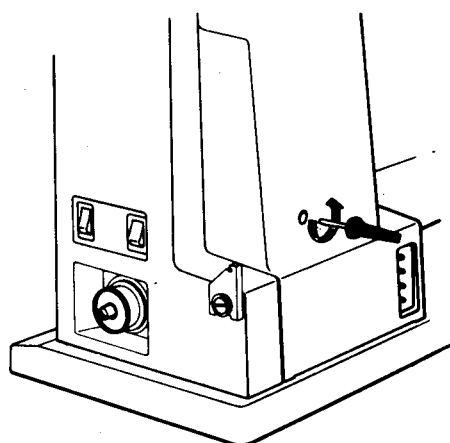
Thereafter, press the button under 130, which gives 3.0 mm forward and reverse feeding and repeat the test. Now return to the button under 120 and readjust the bushing of the guide shaft, if necessary, and then to the button under 130 and the long adjustment screw.

Now test sew with cassette A4 (flatlock) and buttonhole. Under certain conditions it may happen that the buttonhole balance is not correct, in spite of the fact that balance has been reached when forward and reverse feeding with the service cassette. If this is the case adjustment should not be carried out by means of the potentiometers on the control panel but instead another position. If the machine feeds forwards, turn anti-clockwise; if it feeds in reverse turn clockwise must be found with the long adjustment screw where a satisfactory buttonhole balance result can be obtained. Then check the flatlock as well, i.e. A4.

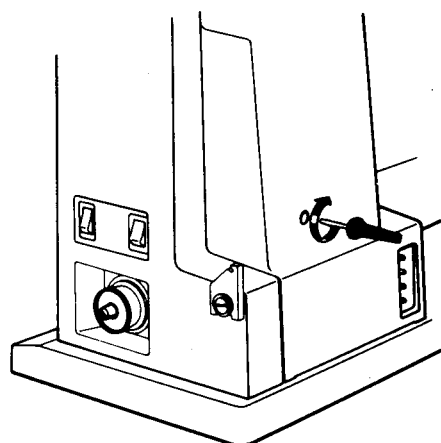


Compare page 30.

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## Cable holder, flat cable and printed circuit.

### Mounting

Mount the cable holder (4/37) and allow the outlet to go inside the holder (4/34) for the fork spring. Fix the wiring from the step motor of the needle bar at the uppermost notch and from the feeding mechanism at the lowest notch. Mount the flat cable from the front panel and place the cable guard (4/41) in such a way that the flat cable is held against the printed circuit in the rear cover. The flat cable from the fuse circuit is

run direct to the printed circuit. Stretch the cables to the left. Mount the step motor drive circuit in the rear cover. Put the spacing sleeve (5/3) on the lower screw (5/4) in the rear cover, place the plastic cone (11/46) at the adjustment screw (11/31) and mount the cover.

Mount the belt-guard and handwheel.

